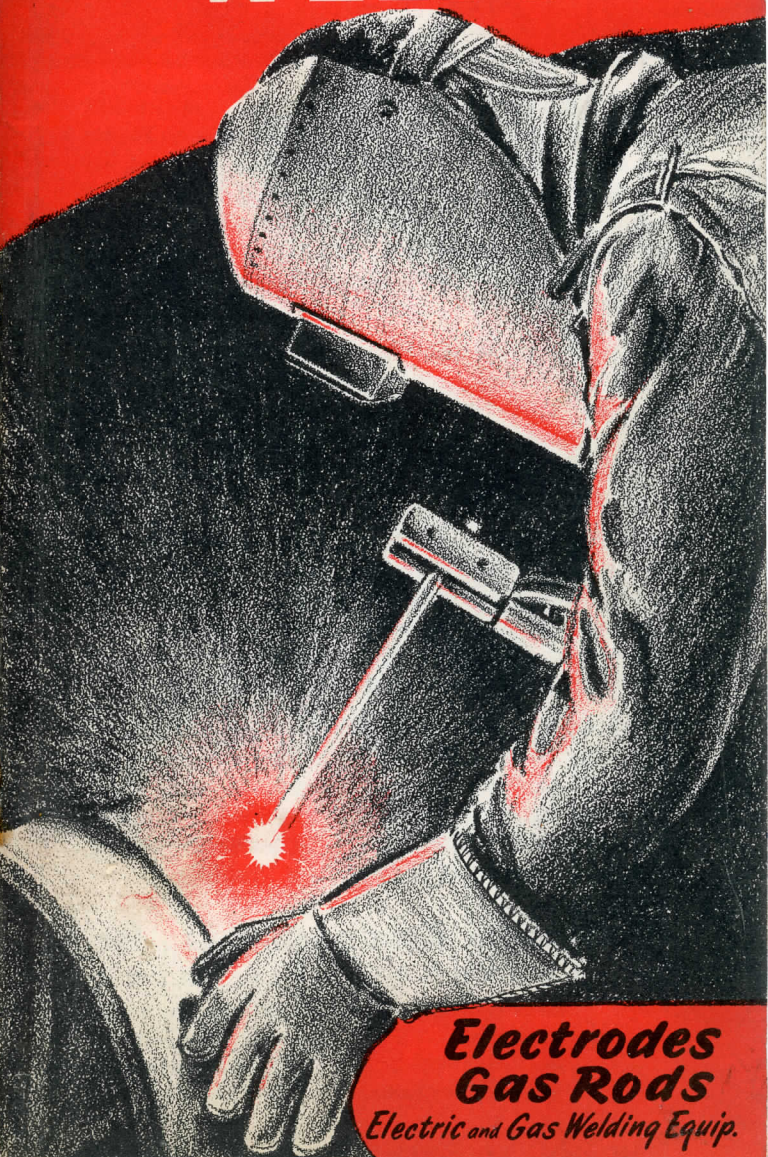
BULLETIN ER 8511

MARQUETTE

REGISTERED U.S. PAT. OFFICE

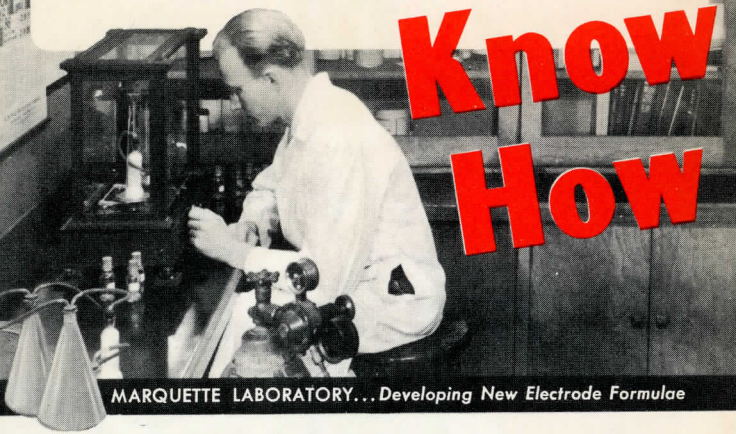
Guide to BETTER WELDING



Electrodes
Gas Rods
Electric and Gas Welding Equip.

MARQUETTE

REGISTERED U.S. PAT. OFFICE



MARQUETTE LABORATORY... *Developing New Electrode Formulae*

The Indianapolis Speedway Race . . . is the 500 mile proving ground for Marquette Welds—to Prove that Marquette Electrodes have-what-it-takes, to come thru this severest test with flying colors! It's a grueling test, where every shock, stress and strain is multiplied a thousandfold, and vibrations literally tear metal apart—yet, not a Single Marquette Weld failed!

Marquette Laboratories' Know How . . . is producing truly outstanding electrodes . . . leaders in the field! Thru their men in the field, Marquette keeps in touch with the pulse of industry, and prepares for the future by developing new electrodes to weld the new alloys.

The First Step . . . is to carefully compound and develop new formulae for superior electrode coatings. Sample electrodes are then made by the laboratory extruding machine. The deposited weld metal then receives exhaustive tests and careful inspection . . . a few of which are illustrated here.

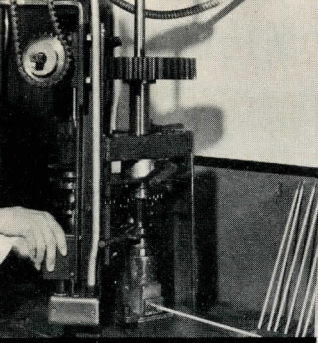
The Guide to Better Welding . . . would not be complete, without Marquette Electric and Gas Welding Equipment—for the Farm, Welding Shop and Industrial Production. The Best in Equipment, plus "the Right Rod for the Job", that's the winning Marquette combination for Better Welding.

Marquette Manufacturing Co., Inc.

MINNEAPOLIS 14, MINN.

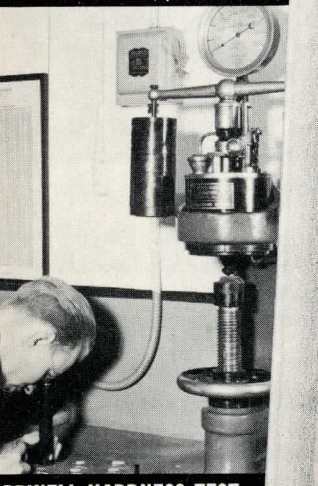
Main Office.....**307 East Hennepin Avenue**
Main Plant.....**409 N. E. Johnson Street**
Electrode Plant.....**17 S. E. Second Street**
Oxy-Acetylene Equip. Plant..**214 Fourth Ave. S. E.**

Manufacturer reserves the right to make changes in design, construction or materials as necessary.



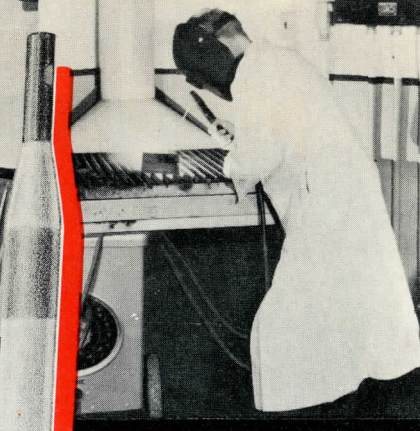
LABORATORY EXTRUDING MACHINE
Making Sample Electrodes

RIEHLE TESTING MACHINE
For Tensile Strength, Elongation, Yield Point, Etc.

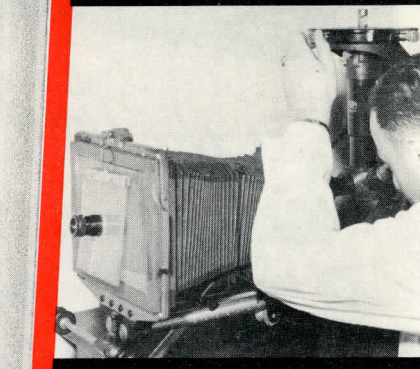


BRINELL HARDNESS TEST
Testing Sample Welds

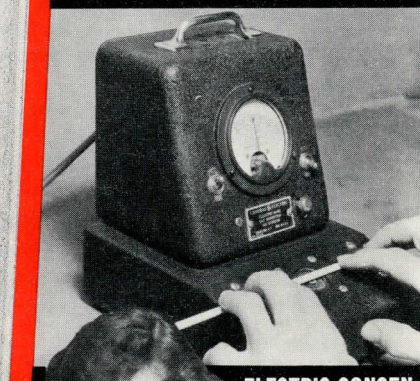
Final Inspection . . . of every Marquette Electrode by skilled inspectors



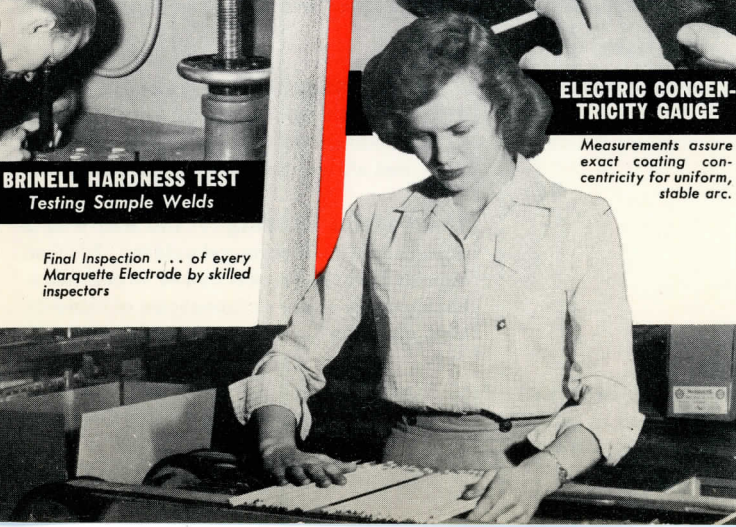
WELDING SHOP . . . For A.C.-D.C.
Checking Arc Characteristics



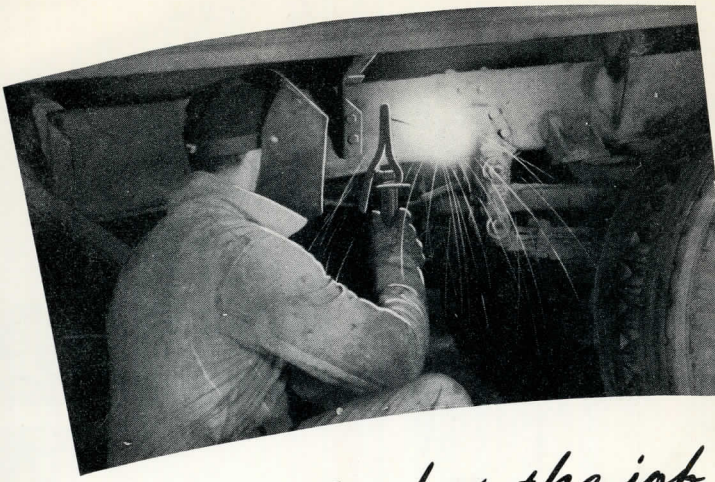
METALLOGRAPHIC MICROSCOPE
Inspecting Weld Structure



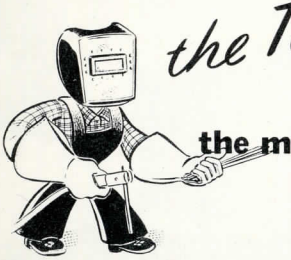
ELECTRIC CONCENTRICITY GAUGE
Measurements assure exact coating concentricity for uniform, stable arc.



AWS E6011 MILD STEEL



the Tougher the job...



the more 130 RED-ROD Proves its worth

- Auto and Truck Repair
- Body and Fender Welding
- Farm Equipment
- Pipe, Tanks
- Repair Work
- Maintenance
- Structural Steel
- Jigs and Fixtures
- Cabinets, Etc.
- Sheet Metal

Strong, Good Appearing Welds . . . 130 Red-Rod is unequalled for ease of operation in all positions, and all purpose welding. It is easy for the welder to get good results even on the most difficult jobs.

Deep Penetration . . . for Fillet Welds, Single V-butt Welds and for Tack Welding is obtained with slightly higher amperages.

Poor Fit-Ups . . . Ideal for those difficult poor fit-up jobs. Easy Arc Control plus Rapid Weld Metal Solidification, combine to make this electrode tops for bridging large gaps on poor fit-ups.

Good Arc Stability . . . Unusually good stability with Low Amperages enable the welder to direct the arc easily, without deflection—and always maintain a good, steady arc.

Sheet Metal Welding . . . 130 Red-Rod is unsurpassed for sheet metal welding. It's fast, handles beautifully, and makes strong welds. Excellent for repair or fabrication of cabinets, bins, etc., and for body and fender work.

Heavy Structural Jobs . . . 130 Red-Rod is equally well suited for building or repairing heavy steel structures. Gives Good Fusion with Good Penetration.

ELECTRODES A. C.

ALL PURPOSE
ALL POSITION

HOW TO USE: Weld with A.C. or D.C. (reverse polarity). Hold a short arc—one that is long enough to just keep the electrode from touching the molten metal.

Flat Butt and V-Joints . . . Use an oscillating motion, with slight hesitation at the edges.

On Heavy Plates . . . Vertical Up Welding is recommended.

On Light Work . . . Use Vertical Down Welding with slight oscillating weave and a small bead.

Overhead Welding . . . use either stringer or oscillating methods. On Overhead Fillets, use Circular Motion. The rapid solidification of the weld metal speeds up Overhead Welding. Use electrodes 5/32" and under for overhead work.

Color Identification: Light Tan Coating, Red Band near grip, Plain tip with Blue Spot.

Meets Following Specifications:

American Welding Society . . . . . Class E6010 and E6011
U. S. Navy . . . . . Spec. 46-E3 (INT) Grade 3
Army-Navy Aeronautical Spec. . . . . AN-E9 Class B
U. S. Army Spec . . . . . No. 57-203-1B Class WD - E6010
American Bureau of Shipping . . . . . H_1 G and B_1 G

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	70,000 to 75,000 psi	65,000 to 70,000 psi
Yield Point	60,000 to 65,000 psi	55,000 to 60,000 psi
% Elongation in 2"	23% to 25%	30% to 35%
Reduction in Area	50% to 55%	65% to 75%

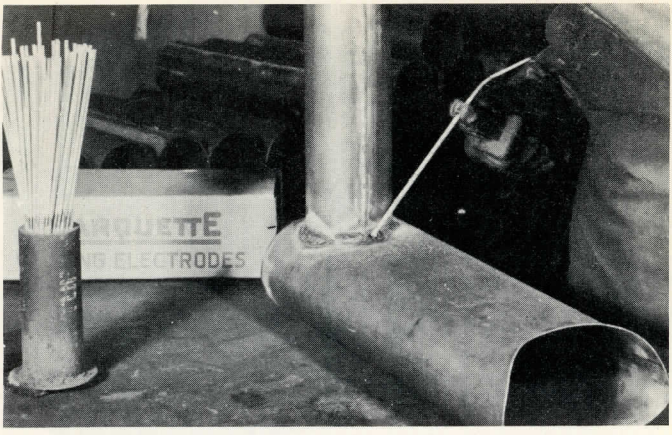
Chemical Analysis of Deposited Metal:

Carbon . . . . . 0.06 - 0.10%
Manganese . . . . . 0.50 - 0.60%
Silicon . . . . . 0.10 - 0.25%
Sulphur . . . . . 0.025 - 0.035%
Phosphorus . . . . . 0.010 - 0.025%

Recommended Amperages

Diam.		5/64"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	20-55	20-75	75-130	100-175	150-225	175-250	200-375
	Vertical	20-55	20-65	75-115	100-150	150-200	.....	.....
	Overhead	20-55	20-65	75-115	100-150	.....	.....	.....
Volts		16-22	16-22	20-24	21-25	22-26	24-28	24-28

AWS E6013 MILD STEEL A.C.



No. 140 PRODUCTION-ROD

- Sheet Metal
- Pipe, Tanks
- Boilers
- Structural Steel
- Maintenance
- Repair Work
- Trucks, Cars
- Farm Equipment

All Purpose — All Position

Good Appearing Welds . . . finished work has that "professional look" and is tops for quality and appearance.

Exceptional Arc Stability . . . Arc Starts Easily, gives smooth, steady metal deposit without excessive welding spatter. The slag brushes off easily.

Smooth, Clean . . . closely rippled weld metal deposit with good appearance.

Fast, Efficient . . . No. 140 is a true Production Rod in All Positions, with a wide amperage range for stepped-up welding speeds.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity). Hold a short arc, just long enough to keep the electrode from touching the molten metal.

Flat Position, Butt or V-Joints . . . use oscillating motion, with slight hesitation at the edges.

Vertical Welding Heavy Sections . . . Weld from the bottom upwards for the best strength and ductility.

Vertical Welding Light Work . . . for vertical down welding, use straight fast stringer bead.

Overhead Welding . . . use stringer or oscillating methods. In Overhead Welding use rods 5 32" or under.

Color Identification: Brown coating, plain tip with blue spot.

Meets Following Specifications:

American Welding Society . . . . . Class E6013
U. S. Navy . . . . . Spec. 46-E3 (INT) Grade 3
Army-Navy Aeronautical Spec. . . . . AN-E9 Class A
U. S. Army Spec. . . . . No. 57-203-1B Class WD-6013 and WD-6012
American Bureau of Shipping . . . . . H_1G, B_2G and B_1G

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	68,000 to 75,000 psi	65,000 to 70,000 psi
Yield Point	55,000 to 65,000 psi	50,000 to 60,000 psi
% Elongation in 2"	23% to 27%	27% to 35%
Reduction in Area	50% to 55%	60% to 70%

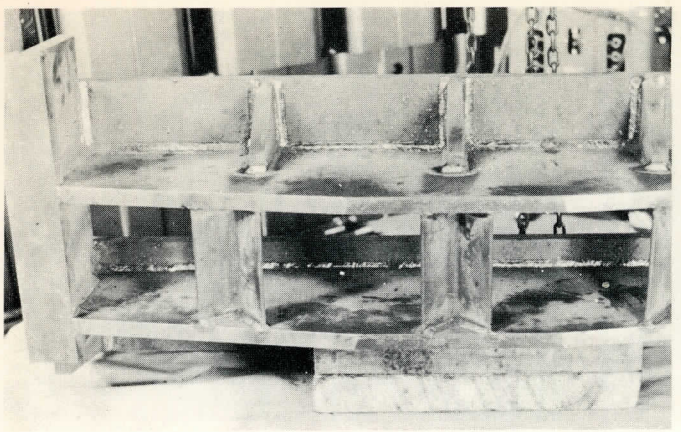
Chemical Analysis of Deposited Metal:

Carbon . . . . . 0.06 - 0.10%
Manganese . . . . . 0.50 - 0.60%.
Silicon . . . . . 0.10 - 0.25%
Sulphur . . . . . 0.025 - 0.035%
Phosphorus . . . . . 0.010 - 0.025%

Recommended Amperages

Diam.		5/64"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	20-55	20-75	75-130	100-175	150-225	175-250	200-375
	Vertical	20-55	20-65	75-115	100-150	150-200	.....	.....
	Overhead	20-55	20-65	75-115	100-150	.....	.....	.....
Volts		16-22	16-22	20-24	21-25	22-26	24-28	24-28

AWS E6013 MILD STEEL A.C.



No. 151 WHITE-ROD

- Auto Body and Fender
- Structural Steel
- Jigs & Fixtures
- Farm Machinery
- Pipe Lines
- Tanks & Boilers
- Trucks, Trailers, Frames & Bodies
- Shaft Build-up

All Purpose — All Position

For Poor Fit-ups . . . this electrode is ideal for filling in wide gaps without burning through the metal.

Soft, Steady Arc . . . steady, uniform metal transfer with freedom from excessive spatter.

Well Rounded Beads . . . the high crowned weld has shallow penetration with good fusion. Penetration reaches to the root of fillets.

Good Performance in All Positions . . . Widely used for welding large, bulky structures which cannot be readily positioned.

HOW TO USE: Weld with A.C. or D.C. machines. (Designed for A.C. welders, but also performs well on D.C. with straight polarity). Hold the arc as short as possible without sticking or choking.

Vertical Fillet Welds . . . are best made by starting from the bottom and moving upwards.

Thin Material . . . weld vertically down, with small beads, and using higher amperage with medium short arc. Keep the electrode at 70° angle from the surface.

Overhead Welding . . . use a medium short arc and either oscillating or stringer technique. On Overhead Welding, use electrodes 5/32" or under.

Color Identification: White coating, plain tip with brown spot.

Meets Following Specifications:

American Welding Society	Class E6013 and E6012
U. S. Navy (Approved)	Spec. 46-E3 (INT) Grade 3
Army-Navy Aeronautical	Spec. AN-E9 Class A
U. S. Army	Spec. No. 57-203-1B WD-6013 and WD-6012
American Bureau of Shipping	H_1G, B_2G, and B_1G

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	65,000 to 75,000 psi	60,000 to 65,000 psi
Yield Point	50,000 to 60,000 psi	45,000 to 50,000 psi
% Elongation in 2"	22% to 27%	30% to 35%
Reduction in Area	50% to 55%	65% to 70%

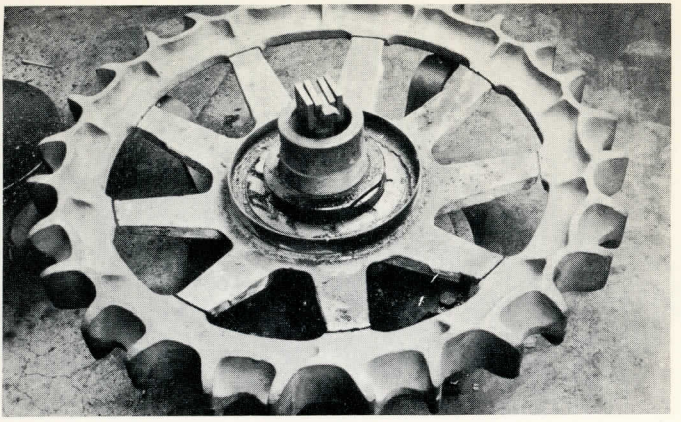
Chemical Analysis of Deposited Metal:

Carbon	0.08 - 0.12%	Sulphur	0.025 - 0.035%
Manganese	0.55 - 0.65%	Phosphorus	0.010 - 0.025%
Silicon	0.15 - 0.25%		

Recommended Amperages

Diam.		5/64"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	20-55	20-75	115-150	130-175	150-225	175-250	225-400
	Vert.	20-55	20-65	100-130	115-175	150-200	.....	.....
	Overhead	20-55	20-65	100-130	115-150	.....	.....	.....
Volts		16-22	16-22	20-24	21-25	22-26	24-28	24-28

AWS E6012 MILD STEEL A.C.-D.C



No. 120 CODE-ROD

- Machinery Fabrication
- Sheet Metal
- Construction Equipment
- Auto Parts
- Truck Bodies
- Storage Tanks
- Repair and Maintenance

All Position Production Rod

D.C. (straight polarity) or A.C.

Designed for D.C. . . . (straight polarity) but may also be used with A.C. Welders.

All Position . . . Flat, Vertical, Overhead or Horizontal.

Handles Easily . . . on light sheet metal or heavy steel structures. Weld metal handles easily, but is not too fluid. Features Shallow Penetration with Good Fusion, and readily bridges the gaps on poor fit-up jobs.

Good Appearance . . . the welds have smooth, well rounded beads with closely rippled surface. The fillets are convex, without undercutting.

HOW TO USE: Weld with D.C. (straight polarity) or A.C. machines. Hold a medium short arc.

Vertical Welding Heavy Plates . . . weld from the bottom upwards to obtain the maximum strength and ductility.

Sheet Metal and Light Sections . . . best welding is obtained with higher amperages, and positioning the work for downhill welding.

Overhead Welding . . . stringer or oscillating methods produce equally fine results.

Clean All Slag . . . from each deposited bead before proceeding to the next.

Color Identification: Gray-Tan coating, plain tip with white spot.

Meets Following Specifications:

American Welding Society	Class E6012
U. S. Army Spec.	No. 57-203-1B Class WD - E6012
Army-Navy Aeronautical Spec.	AN-E9 Class A
American Bureau of Shipping	H_1G, B_1G (As Welded)

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	70,000 to 75,000 psi	65,000 to 70,000 psi
Yield Point	60,000 to 65,000 psi	55,000 to 65,000 psi
% Elongation in 2"	22% to 27%	25% to 30%
Reduction in Area	50% to 55%	60% to 65%

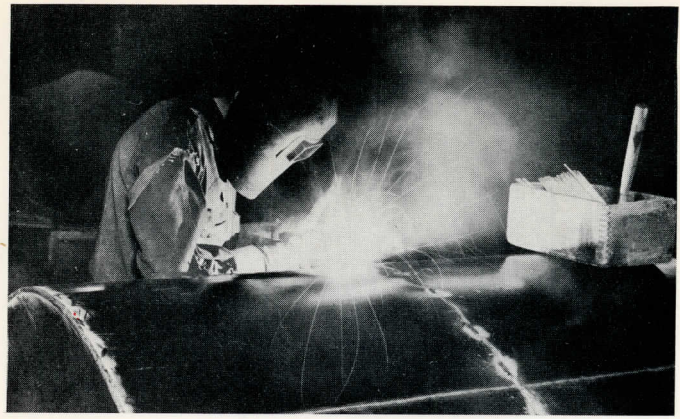
Chemical Analysis of Deposited Metal:

Carbon	0.08 - 0.13%	Sulphur	0.03% max.
Manganese	0.45 - 0.65%	Phosphorus	0.03% max.
		Silicon	0.15 - 0.25%

Recommended Amperages

	Diam.	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	45-85	115-150	130-175	150-225	175-275	225-450
	Vertical	45-75	100-130	115-175	150-200	.....	.....
	Overhead	45-75	100-130	115-150	.....	.....	.....
	Volts	16-22	20-24	21-25	22-26	22-26	24-28

AWS E6010 MILD STEEL D.C.



No. 105 POSITIVE-ROD

- Structural Fabrication
- Shipbuilding
- Bridges
- Pipe Lines
- Storage Tanks
- Wrought Iron Piping
- General Repairs
- Maintenance

All Position—General Purpose

D.C. (Reverse Polarity)

Deeply Penetrating . . . a fast, deep biting welding electrode. The digging action insures good root penetration in Fillet or Single "V" type Butt Welds.

Fast Metal Transfer . . . weld metal is fast flowing and solidifies quickly. Important factors in vertical and overhead welding. The finished weld is flat, being neither convex nor concave.

Slag Easily Removed . . . Slag is brittle, and easy to remove. Low melting point prevents slag entrapment.

HOW TO USE: Weld with D.C. (reverse polarity). Hold a medium to short arc. Coating should not touch the molten metal.

Clean Each Bead . . . before applying next.

Vertical and Overhead Welds . . . use only 1 8″ electrodes where joints are tight, 5 32″ for all normal spacings, and 3 16″ for upper beads on heavy plate.

Flat Position, Butt or V-Joints . . . use an oscillating motion with a slight hesitation at the edges.

Vertical Welding Heavy Sections . . . weld from the bottom upwards for the best strength and ductility.

Vertical Welding Lighter Work . . . use vertical down welding with a slight oscillating weave and a small bead.

Overhead Welding . . . use several narrow beads. Keep the molten pool as small as possible.

Color Identification: White Coating - Plain Tip.

Meets Following Specifications:

American Welding Society . . . . . Class E6010
U. S. Navy . . . . . Spec. 4C-E3 (INT) Grade 1
Army-Navy Aeronautical Spec. . . . . AN-E9 Class B
U. S. Army Spec. . . . . No. 57-203-1B Class WD - E6010
American Bureau of Shipping . . . . . H_1 G and B_1 G

Physical Properties of Deposited Weld Metal:

	As Welded	Stress Relieved
Tensile Strength	62,000 to 70,000 psi	60,000 to 65,000 psi
Yield Point	50,000 to 55,000 psi	47,000 to 52,000 psi
% Elongation in 2″	25% to 35%	27% to 37%
Reduction in Area	40% to 45%	45% to 50%

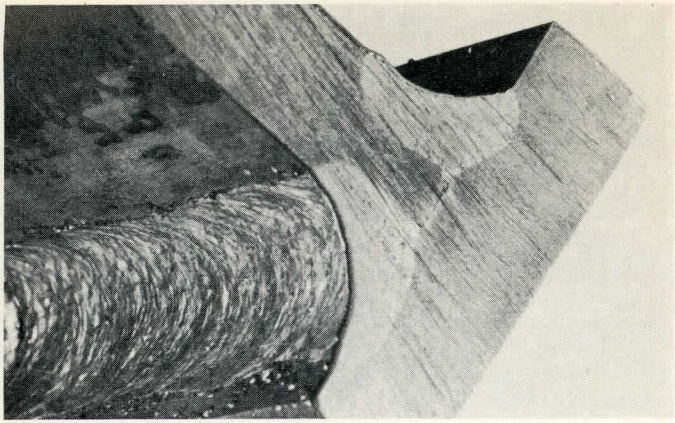
Chemical Analysis of Deposited Metal:

Carbon . . . . . 0.08 - 0.12
Manganese . . . . . 0.45 - 0.55
Silicon . . . . . 0.15 - 0.25
Sulphur . . . . . 0.03 max.
Phosphorus . . . . . 0.03 max.

Recommended Amperages

	Diam.	3/32″	1/8″	5/32″	3/16″	7/32″	1/4″
AMPS	Flat	45-85	115-135	135-175	150-200	200-250	225-300
	Vertical	45-75	110-125	130-150	150-175	. . . . .	. . . . .
	Overhead	45-75	110-125	130-150	. . . . .	. . . . .	. . . . .
Volts		20-24	21-25	22-26	23-27	24-28	24-28

AWS E6020 MILD STEEL A.C.-D.C.



No. 115 HOT-ROD

- **Shipbuilding**
- **Heavy Pipe**
- **Boilers**
- **Pressure Vessels**
- **Massive Machinery**
- **Fabricated Structural Shapes and Heavy Sections**

Horizontal and Positioned Downhand and Fillet Welds

Higher Amperages . . . A Special Electrode that performs best with much higher amperages than any other type electrode.

Faster Welding . . . it deposits more weld metal per hour than any other general purpose electrode!

Special Position . . . All welding must be done in Flat Position, or in Horizontal Fillet (one plate vertical) Position.

Smooth Beads . . . the fillets are concave. The weld metal blends smoothly with the plate side walls without undercutting.

Easy Slag Removal . . . slag is voluminous, brittle and easy to remove when cooled.

HOW TO USE: Weld with A.C. or D.C. (either polarity).

Easy Arc Control . . . Hold a very short arc — the coating may rest lightly on the work as the arc, almost automatically consumes the rod.

Move Slowly . . . care must be taken to move slowly enough to completely fill the groove.

Position All Work . . . All welding must be done in the Flat or Horizontal Position.

Hot Slag . . . is sticky, but when cooled, becomes brittle like glass, and is easily removed.

Color Identification: Dark brown coating, blue tip.

Meets Following Specifications:

American Welding Society	Class E6020
American Bureau of Shipping	H_1F and B_1F
U. S. Navy	Spec. 46-E3 (INT) Grade 2, Class 2
U. S. Army	Spec. No. 57-203-1B Class WD - E6020

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	66,000 to 73,000 psi	60,000 to 68,000 psi
Yield Point	50,000 to 60,000 psi	46,000 to 56,000 psi
% Elongation in 2"	25% to 28%	30% to 35%
Reduction in Area	40% to 45%	45% to 55%

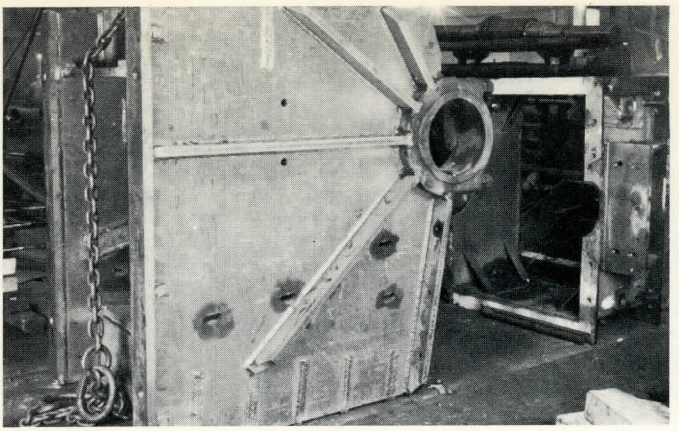
Chemical Analysis of Deposited Metal:

Carbon	0.08 - 0.12%	Sulphur	0.03% max.
Manganese	0.25 - 0.55%	Phosphorus	0.03% max.
		Silicon	0.15 - 0.35%

Recommended Amperages

	Diameter	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	130-150	175-200	200-250	250-300	300-350
	Groove	130-150	175-200	200-250	275-300	300-350
	Hor. Fillet	130-150	175-200	200-250	275-300	300-350
Volts		21-25	22-26	24-28	29-31	30-32

AWS E8011 High Tensile Steel A.C.-D.C.



No. 85 HY-TEST-ROD

- Pressure Vessels
- Heavy Duty Trailers
- Truck Frames
- Forging Dies
- Railway Cars
- Automobile Frames
- Boilers
- Dipper Baskets

All Position—High Strength
Extraordinary Toughness

Produces welds with Tensile Strength of 80,000 to 90,000 psi, and Extraordinary Toughness (20% elongation in 2" as welded).

High Strength . . . an Extra Margin of Safety on jobs where strength is of prime importance.

Good Appearance . . . smooth, closely rippled, and slightly convex welds are made with this Manganese-Molybdenum Alloy Electrode.

Soft, Steady Arc . . . makes high quality welding easier, in all positions, and with no excessive spatter.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity). Hold the arc as short as possible without sticking or choking.

Vertical Welding Heavy Plates . . . weld from the bottom upward to obtain the maximum in strength and ductility.

Vertical Welding Lighter Work . . . use regular vertical down welding.

Overhead Welding . . . stringer or oscillating methods produce equally fine results. In Overhead Welding use rod 5/32" or under.

Color Identification: Cream colored coating, gray tip with red spot.

Meets Following Specifications:

American Welding Society . . . . . Class E8011 and E8010

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	85,000 to 95,000 psi	80,000 to 90,000 psi
Yield Point	65,000 to 75,000 psi	60,000 to 70,000 psi
% Elongation in 2"	18% to 22%	20% to 25%
Reduction in Area	25% to 35%	30% to 40%

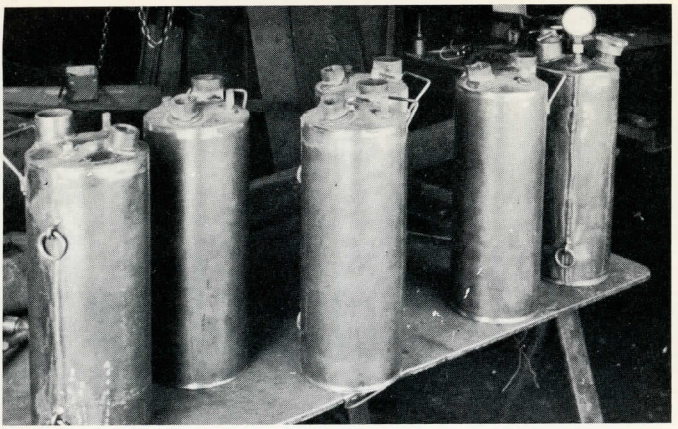
Chemical Analysis of Deposited Metal:

Carbon	0.10 - 0.15%	Molybdenum	0.40 - 0.60%
Manganese	0.95 - 1.05%	Sulphur	0.05% max.
Silicon	0.25 - 0.35%	Phosphorus	0.03% max.

Recommended Amperages

Diameter		1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	115-150	130-175	150-225	175-250	225-400
	Vertical	100-130	115-150	150-200	. . . . .	. . . . .
	Overhead	100-130	115-150	. . . . .	. . . . .	. . . . .
Volts		20-24	21-25	22-26	22-26	24-28

AWS E10011 High Tensile Steel A.C.-D.C.



No. 110 HY-TEST-ROD

- Structural Work
- Gear Teeth
- Dipper Buckets
- Build Up for Hardsurfacing
- Heavy Equipment
- Steel Tanks
- Build Up Worn Shafts, Axles
- Truck, Trailer Frames
- Railroad Cars

Carbon-Chrome, Molybdenum Alloy Steel—All Position

For High Tensile Steels

Developed for welding High Tensile Steels of 100,000 lbs. psi or more.

For Moderate Abrasion and Shock . . . use this electrode for building up worn parts.

Sturdy Build Up for Hard Surfacing . . . makes extremely strong base (100,000 lbs. psi) for hardsurfacing on rock crushers, etc.

More Economical . . . it's not only better, but more economical — it adds strength where it's needed most, and saves expensive Hard Surfacing Rods for the top "working surfaces".

Machineable . . . the weld metal, when deposited under ordinary conditions, has a Brinell Hardness of 225 to 275. If the weld deposit is chilled rapidly, it should be annealed and stress relieved before machining.

HOW TO USE: May be used with A.C. or D.C. (either polarity). Use a medium short arc.

Vertical Welds . . . should be made from the bottom up for maximum strength and ductility.

Vertical Welding Lighter Work . . . regular down welding is faster, and may be used on all lighter work.

Overhead Welding . . . use stringer or oscillating methods and electrodes 5/32" or under.

Clean All Slag . . . from each deposit before proceeding to the next.

Color Identification: Light gray-green coating, brown tip with white spot.

Meets Following Specifications:

American Welding Society . . . . . Class E10011
U. S. Navy . . . . . Spec. 46-E10 (SHIPS) Grade EE

Physical Properties of Deposited Metal:

	As Welded	Stress Relieved
Tensile Strength	100,000 to 110,000 psi	100,000 to 110,000 psi
Yield Point	90,000 to 110,000 psi	90,000 to 100,000 psi
% Elongation in 2"	10% to 15%	12.5% to 15%
Reduction in Area	15% to 20%	20% to 25%

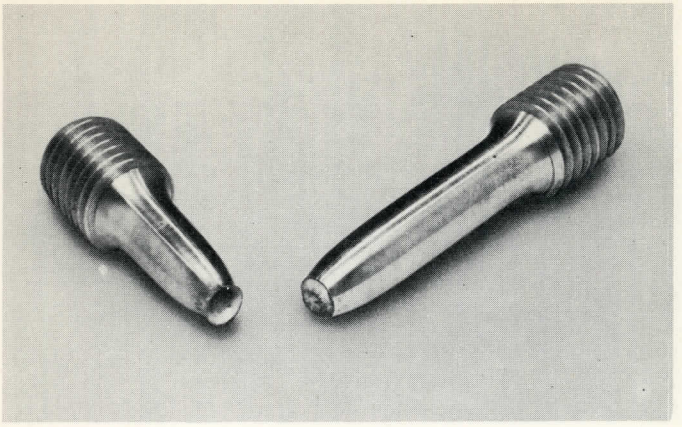
Chemical Analysis of Deposited Metal:

Carbon	0.10 - 0.14%	Molybdenum	0.20 - 0.40%
Manganese	0.50 - 0.75%	Sulphur	0.03% max.
Silicon	0.20 - 0.30%	Phosphorus	0.03% max.
		Chromium	0.60 - 1.00%

Recommended Amperages

	Diameter	1/8"	5/32"	3/16"	7/32"	1/4"
AMPS	Flat	115-150	130-175	150-225	175-250	225-400
	Vertical	100-130	115-175	150-200	.....	.....
	Overhead	100-130	115-150	.....	.....	.....
Volts		20-24	21-25	22-26	22-26	24-28

HIGH TENSILE STEEL A.C.-D.C.



No. 2512 NICKELOY-ROD

- Bumper Brackets
- Railroad Equipment
- Road Scrapers
- Snow Plows
- Heat Exchangers
- High Manganese Steels
- Bars and Beverage Dispensers
- Dairy Equipment
- Pipe Welding

Low Carbon, 5% Nickel Alloy Steel—All Position

S. A. E. 2512 Steel

Low Temperature Toughness . . . use this low carbon 5% Nickel Alloy Steel Electrode where high tensile strength and maximum ductility are required (ordinary steels become brittle at sub-zero temperatures). Nickel Steels have the highest resistance to shock and impact in sub-zero temperatures.

Finely Grained Weld Deposit . . . features high tensile strength at both temperature extremes — furnaces to snow plow blades.

Increased Ductility . . . the slag covering reduces the cooling rate of the weld metal thereby improving the ductility. The weld bead is slightly convex, and has good fusion.

HOW TO USE: Weld with A.C. or D.C. (either polarity). Hold the arc as short as possible without sticking or choking.

Vertical Welding Heavy Plates . . . weld from the bottom upwards to obtain the maximum strength and ductility.

Vertical Welding Lighter Work . . . use vertical down welding.

Overhead Welding . . . stringer or oscillating methods produce fine results when used with electrodes 5/32" or under.

Color Identification: White coating, orange tip with green spot.

Physical Properties of Deposited Metal: (Average Shop Conditions)

	As Welded
Tensile Strength	80,000 to 90,000 psi
Yield Point	65,000 to 75,000 psi
% Elongation in 2"	25% to 30%
Reduction in Area	50% to 55%

(Note: The properties of this weld metal vary greatly with the temperature from which the steel is cooled and the manner of cooling.)

Chemical Analysis of Deposited Metal:

Carbon	0.10 - 0.15%	Sulphur	0.03% max.
Manganese	0.35 - 0.55%	Phosphorus	0.03% max.
Silicon	0.25 - 0.35%	Nickel	4.75 - 5.25%

Recommended Amperages

Diameter		1/8"	5/32"	3/16"	1/4"
AMPS	Flat	115-150	130-175	150-225	225-400
	Vertical	100-130	115-175	150-200	. . . . .
	Overhead	100-130	115-150	. . . . .	. . . . .
Volts		20-24	21-25	22-26	24-28

No. 100 HARD-ROD

- High Carbon Steels
- Crusher Rolls
- Tractor Shoes and Rollers
- Sprockets
- Well Drilling Tools
- Pulverizer Rams
- Gear Teeth
- Shafts

High Carbon—For Hard Surfacing

Produces a weld metal deposit of high carbon, alloy steel.

Controlled Hardness . . . Air Cool for 225 to 375 Brinell Hardness.

Water Quenching . . . at 1400° - 1500° will produce 500 - 600 Brinell Hardness. Oil Quench and Draw at proper temperatures for intermediate hardness and greater toughness.

Machineable . . . weld metal must be annealed before machining.

Smooth Welds . . . the very stable arc combines with the even metal flow to make narrow beads that are smooth and require very little grinding.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity). Hold a medium short arc and deposit narrow string beads.

Clean Thoroughly . . . the area must be cleaned of all rust, dirt and grease for good, sound welds. Brush each bead before depositing the next.

Low Amperage . . . All high carbon steel electrodes have a high electrical resistance, and tend to heat up. Use as low amperage as possible for good fusion. Never allow the electrode to become red hot.

Vertical Welding . . . start at the bottom and weld up.

Color Identification: Gray coating, blue spot with brown end.

Physical Properties of Deposited Metal:

These vary greatly depending upon the cooling rates and heat treatment.

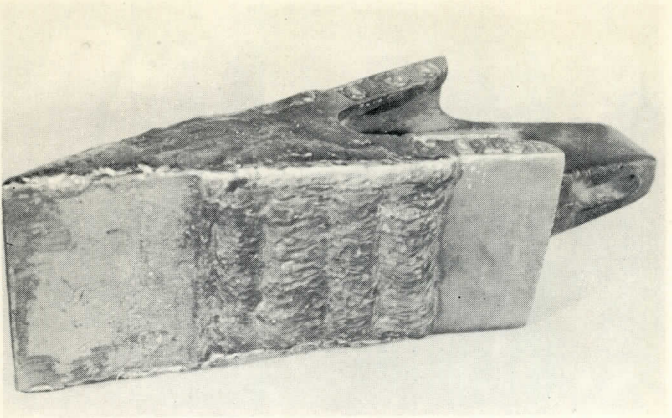
225-600 Brinell Hardness . . . . . 20 - 58 Rockwell "C"

Chemical Analysis of Deposited Metal:

Carbon	0.90 - 1.05%	Phosphorus	0.030%
Manganese	0.25 - 0.45%	Sulphur	0.030%
Silicon	0.25 - 0.40%	Chromium	0.90 - 1.20%

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
Amperes	65-100	85-130	130-175	175-250	200-275	250-400
Volts	16-22	20-24	21-25	22-26	24-28	24-28



No. 250 MANG-ROD

- Railway Frogs, Crossings and Switches
- Rock Crushers
- Shovel Dippers and Dipper Teeth
- Orange Peel and Clamshell Points, Dipper Tips
- Dredge Parts
- Conveyors
- Crusher Hammers and Rollers
- Farm Equipment

A 5% Nickel-Manganese Rod

For 12% to 14% Manganese Steel For Manganese Overlays on Steel

This Shielded Arc electrode produces an austenitic, high manganese, nickel-steel weld metal deposit.

Tough, Resists Wear and Impact . . . has a high resistance to wear and impact. Deposited weld metal is relatively soft when deposited, and is work hardening. Toughness and hardness increase with hard use.

Hot Forging . . . weld deposit may be hot forged to any desired shape. Annealing or heat treatment will not soften metal deposit, which is not machineable.

Excellent Arc Stability . . . deposits a smooth, clean weld bead, virtually without slag. Requires very little cleaning between multiple passes.

For Overlaying Carbon Steel . . . A Mang-Rod overlay provides an excellent wearing surface of Manganese Steel.

HOW TO USE: Clean Area Thoroughly . . . Grind the surface to remove surface cracks, rust, grease or other foreign matter. Cracks too deep for grinding should be gouged out with a cutting torch.

Use Low Amperage . . . use only sufficient heat to give a fluid pool of weld metal at the point of the electrode — for proper welding.

Use Slight Oscillating Motion . . . deposit in narrow string beads until small (about 3 sq. in.) area is covered.

Peen Hammer . . . Peen the hot metal to relieve contraction strains, and thus avoid checking.

No Grinding . . . when done properly, the weld metal deposit is so smooth, that usually no grinding is necessary.

Color Identification: Black coating, red spot with orange end.

Physical Properties of Deposited Metal:

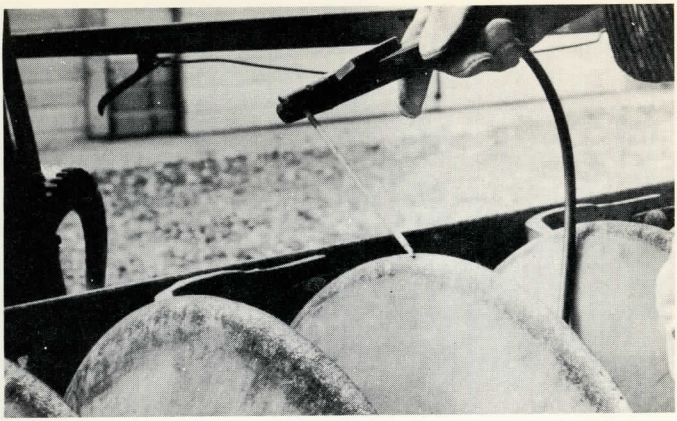
As Welded	(Rockwell "C" 13-25)	190-250 Brinell Hardness
After Cold Working	(Rockwell "C" 50-58)	500-600 Brinell Hardness

Chemical Analysis of Deposited Metal:

Carbon	1.00 - 1.40%	Sulphur	0.050% max.
Manganese	10.00 - 14.00%	Phosphorus	0.040% max.
Silicon	0.30 - 1.00%	Nickel	4.75 - 5.00%

Recommended Amperages

Diameter	1/8"	5/32"	3/16"	1/4"
Amperes	85-130	115-150	130-175	175-275
Volts	20-24	21-25	22-26	24-28



No. 450 HARD-ROD

- Tractor Grousers and Rollers
- Scraper Blades
- Agricultural Implements
- Plow Shares, Hitches
- Power Shovel Dipper Teeth, Drive Sprockets
- Mining Equipment, Coal Cutters, Conveyor Rolls, Buckets, Etc.
- Rock Crushers

Hard Surfacing Alloy Steel

Resists Wear and Severe Impact

Electrode Coating is composed of powdered metals and flux, which combine in the arc with the molten steel core wire to give a very hard weld metal deposit.

Stable Arc . . . is produced by the flux, which also cleans the weld metal deposit.

Work Hardening . . . deposited weld metal is hard when deposited, and requires no heat treatment for maximum strength, ductility and wear resistance.

Hot Forging . . . weld deposit may be hot forged to any desired shape. Annealing or heat treating will not soften metal deposit which is not machineable.

Very Fine Grain . . . the deposited metal is free of slag and porosity. The metal is tough and resistant to wear and impact.

HOW TO USE: Weld with A.C. or D.C. (either polarity). Hold a medium short arc, and deposit the metal with a weaving motion.

Vertical or Flat Welding . . . use either position. The weld metal flows in a fine stream of small particles from the electrode to the work, and is therefore easily controlled.

Slag Removal Unnecessary . . . the slag has a low melting point, and multiple passes may be made without removing the slag between passes. Excessive slag accumulating in corners or depressions should be removed to avoid entrapment however.

Color Identification: Gray coating, brown end with green spot.

Meets Following Specifications:

U. S. Navy . . . . . Spec. 46-E10 (SHIPS) Grade ED
U. S. Army . . . . . Spec. No. 203-5 Class A

Physical Properties of Deposited Metal:

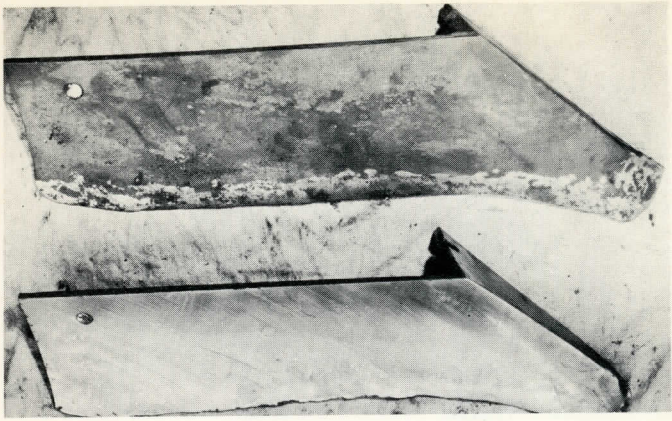
As Welded Condition . . . (Rockwell "C" 46-50) . . . . . 450-500 Brinell Hardness
After Cold Working . . . . (Rockwell "C" 50-54) . . . . . 500-550 Brinell Hardness

Chemical Analysis of Deposited Metal:

Carbon . . . . . 0.50 - 0.60%
Manganese . . . . . 0.30 - 0.50%
Chromium . . . . . 6.0 - 8.0%
Silicon . . . . . 0.50 - 0.70%
Sulphur . . . . . 0.035% max.
Phosphorus . . . . . 0.030% max.

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
Amperes	55-85	100-130	130-150	175-200	175-250	225-275
Volts	20-24	21-25	22-26	23-27	23-28	24-28



No. 550 HARD-ROD

- Road Equipment, Grader Blades, Tractor Drive Sprockets and Track Links
- Agricultural Implements, Cultivator Bits, Plow Shares, Etc.
- Mining Equipment, Conveyors, Tracks, Buckets, Etc.
- Railroad Equipment Frogs, Switches
- Power Shovels, Buckets and Dipper Teeth
- Tractor Shoes and Rollers

Hard Surfacing Alloy Steel

Resists Severe Wear and Moderate Impact

Recommended for jobs where the abrasive wear is very severe, and the impact moderate.

Gives Long Wear . . . this extremely hard weld deposit is free of cracks and porosity.

Self Hardening . . . due to its high alloy content, the weld metal is hard when deposited, and requires no heat treatment for maximum strength, ductility and wear resistance. Heat treating or annealing will not soften weld metal deposit.

Hot Forging . . . weld deposit may be hot forged to any desired shape. It is not machineable.

Overlaying Manganese Steel . . . an overlay of No. 550 protects the manganese steel and prevents much of the abrasive wear which occurs before the Manganese Steel work hardens.

HOW TO USE: Weld with A.C. or D.C. (either polarity). Hold a medium arc, and deposit the metal in a string bead with a slight weave.

Weld Deposits Exceeding 1/4" Depth . . . build up with No. 110 Hy-Test-Rod and overlay with 1/8" to 3/16" of No. 550.

Vertical Welds . . . due to the fast, stable arc, the welding may be done in either a vertical or flat position.

Slag Removal Unnecessary . . . the slag has a low melting point, and multiple passes may be made without slag removal between passes. Excessive slag accumulating in corners, depressions, etc., should be removed to avoid entrapment.

Color Identification: Gray coating, brown end with red spot.

Meets Following Specifications:

U. S. Navy . . . . . Spec. 46-E10 (SHIPS) Grade ED
U. S. Army . . . . . Spec. No. 57-203-5 Class A

Physical Properties of Deposited Metal:

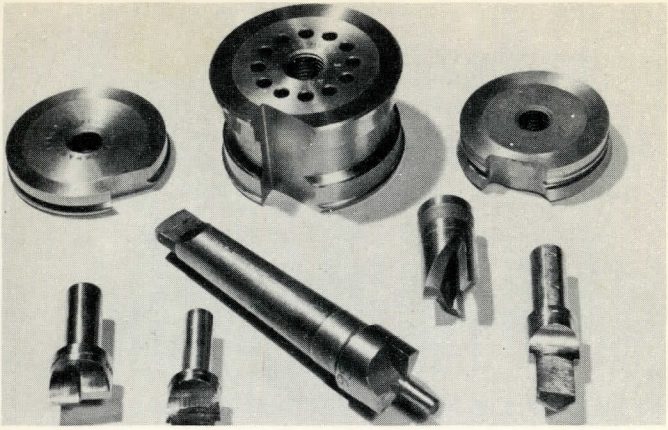
As Welded Condition . . . (Rockwell "C" 54-56) . . . . . 550-575 Brinell Hardness
After Cold Working . . . . (Rockwell "C" 56-59) . . . . . 575-625 Brinell Hardness

Chemical Analysis of Deposited Metal:

Carbon	0.55 - 0.65%	Silicon	0.50 - 0.70%
Manganese	0.30 - 0.50%	Sulphur	0.035% max.
Chromium	7.0 - 9.0%	Phosphorus	0.30% max.
Molybdenum	1.0 - 1.2%		

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"
Amperes	55-85	100-130	130-150	175-200	175-250	225-275
Volts	20-24	21-25	22-26	23-27	23-28	24-28



No. 650 TOOL-ROD

- Lathe Tools
- Forming Dies
- Tools, Jigs, Fixtures
- Sheer Blades
- Drills, Augers
- Blanking and Trimming Dies
- Clutch Parts
- Coal Mining Bits and Augers
- Shredder and Cane Knives

Tungsten Alloy Tool Steel

Hard Cutting Edges and Extreme Abrasion

A High-Speed Steel Electrode . . . that is Self Hardening and has the wear resistance of Cemented Carbide. It is a tungsten-chromium-molybdenum-vanadium steel alloy.

Saves Many Times Its Cost . . . use it for salvaging broken tools and dies, and for producing High Speed cutting edges on new tools and dies.

Very Stable Arc . . . the weld metal is deposited in fine particles at an even rate.

Rockwell "C" Hardness of 60-63 . . . when air cooled. Hardness is increased by oil or water quenching.

Hard Alloy Overlay . . . No. 650 is unsurpassed for resisting the severest wear and abrasion, where impact is not severe.

HOW TO USE: Weld with A.C. or D.C. (straight polarity). Hold a medium short arc, and deposit the metal in a string bead or with a slight weave.

Use Low Amperage . . . as low as will permit Good Fusion and Smooth Deposit. (High Amperages result in excessive admixture of parent metal, and burning of alloys, which softens the weld deposit).

Multiple Layers for Harder Deposit . . . second or succeeding layers have pure weld metal deposit with minimum parent metal admixture.

Forge at White Heat . . . welds may be heat treated for high speed steel (the weld metal as deposited, is self hardening).

Sharp Cutting Edges . . . use small diameter electrodes held 1/4" from edge, at angle shown.

Remove Slag Between Passes . . . All slag should be removed between passes. Slag is very fluid and none will be entrapped. There is no porosity and Slag is easily removed.

Color Identification: Dark blue-gray coating, brown end with yellow spot.

Meets Following Specifications:

U. S. Navy . . . . . Spec. 46-E3 (INT) Grade ED
U. S. Army Spec. . . . . No. 57-203-5 Class A

Physical Properties of Deposited Metal:

As Welded Condition . . . . . Rockwell "C" 60-63

Chemical Analysis of Deposited Metal:

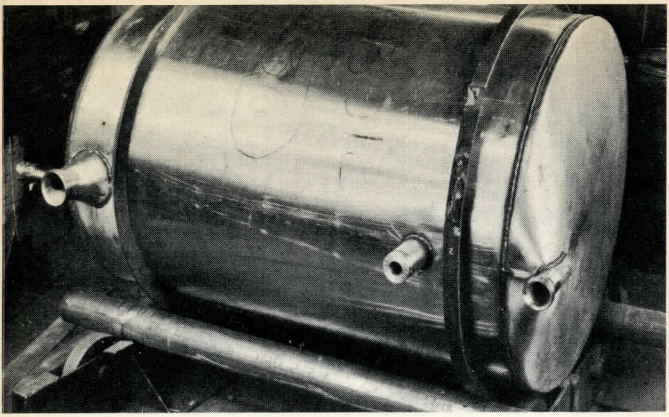
Carbon	0.50 - 0.70%	Manganese	0.30 - 0.50%
Tungsten	3.0 - 4.0%	Silicon	0.50 - 0.80%
Chromium	6.0 - 8.0%	Sulphur	0.035% max.
Vanadium	0.75 - 1.0%	Phosphorus	0.030% max.
Molybdenum	0.80 - 1.0%		

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"
Amperes	65-100	100-130	130-175	175-250
Volts	16-22	20-24	21-25	22-26

STAINLESS STEEL

A. C.-D. C.



No. 308 STAIN-ROD

- Dairy Equipment
- Manganese Steel Dipper Teeth R. R. Frogs, Switches, Etc.
- Chemical Equipment
- Canneries
- Breweries
- Heat Exchangers
- Auto Bumpers
- 18-8 to Steel
- Cast Iron

All Position Stainless Steel

18% Chromium and 8% Nickel for Types 308, 301, 302 and 304.

Lower Alloy 18-8 Steels . . . the weld deposit has the proper Chemical Analysis for Type 308 Stainless Steel, and is therefore well suited to 18-8 types or types of lower alloy content.

Exceptional Smooth Bead . . . with feathered edges and a flat contour.

High Corrosion Resistance . . . equal or greater than the parent metal.

Manganese Steel Overlays . . . provides a better bond, and minimizes checking in manganese steel overlays.

Repair Manganese Steel Parts . . . No. 308 Stain-Rod is used extensively for this important work.

Versatile . . . for superior Welds on High to Medium Carbon, Low Alloy Steels and Cast Iron. (The cast iron is not machineable.)

HOW TO USE: Weld with A.C. or D.C. (either polarity).

Use Lower Amperages . . . and smaller size electrodes. Stainless Steel rods require lower amperages due to their higher electrical resistance.

Tack-weld Carefully . . . or use jigs to hold parts in alignment for welding. Use of heavy clamps, heavy jigs or copper backing strips helps keep warping at a minimum.

Use Short Arc . . . hold as short an arc as possible without allowing the coating to touch the molten metal. Hold the electrode at 15° angle, in the direction of travel.

Stringer Beads Preferred . . . or use a very slight weave.

Cool Weld Rapidly . . . to retain the maximum high tensile characteristics.

Clean All Slag . . . all slag must be thoroughly cleaned between passes.

Color Identification: Brown coating, yellow end, no spot.

Meets Following Specifications:

U. S. Navy . . . . . 46-E4 (INT) Grade 1, Class 1

Physical Properties of Deposited Metal:

	As Welded
Tensile Strength	85,000 to 95,000 psi
Elongation in 2 inches	40% to 50%

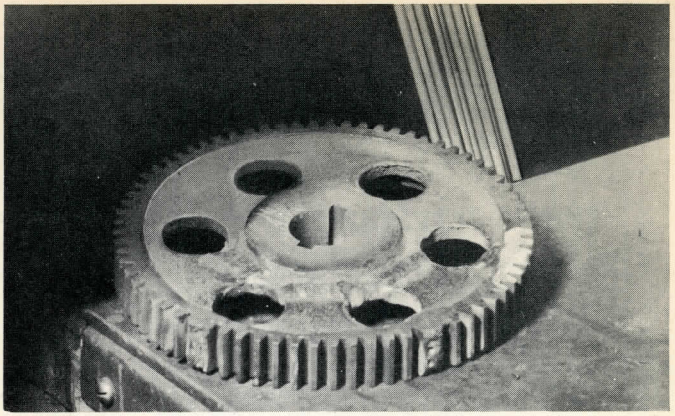
Chemical Analysis of Deposited Metal:

Carbon . . . . . 0.07% max. Nickel 9.0%
Chromium 19.0%

Recommended Amperages

Diameter		1/16"	5/64"	3/32"	1/8"	5/32"	3/16"	1/4"
AMPS	Flat	20-35	30-50	40-70	65-100	100-145	130-190	205-290
	Vertical	15-25	25-35	35-50	55-70	85-100	100-115	.....
	Overhead	20-30	30-40	40-60	60-85	95-120	125-150	.....
Volts		20-22	20-23	22-25	23-26	23-26	24-27	25-28

SPECIAL ELECTRODES A.C.-D.C.



No. 44 NICOL-ROD

- Cylinder Blocks
- Crank Cases
- Cast Iron Sections
- Valve Seats
- Defective Castings
- Gears, Sprockets
- Repair Castings Sand Pockets, Machining Errors, Etc.

Cast or Malleable Iron
Machineable . . Without Preheating

Easy to Use . . . it has superior arc characteristics, easy flowing weld metal, lacks slag, and is exceptionally easy to use in all positions on clean cast iron. Actually worth its weight in gold for salvaging imperfect castings, etc.

Machineable Welds . . . without preheating. Both the weld metal, and weld zone will be machineable on gray cast iron and malleable iron.

Weld Cast or Malleable Iron — to Steel . . . these metals are readily welded together, and are machineable.

Weld Cast or Malleable Iron — to Copper . . . and certain copper alloys. These dissimilar metals are also easily welded with versatile No. 44 Nicol-Rod. The weld metal is steel gray in color.

HOW TO USE: Designed for A.C. or D.C. (either polarity).

Remove All Dirt and Grease . . . Cleanliness is very important to insure good metal adherence and lack of porosity.

Oil Impregnated Castings . . . preheat to a high temperature to evaporate all oil before welding.

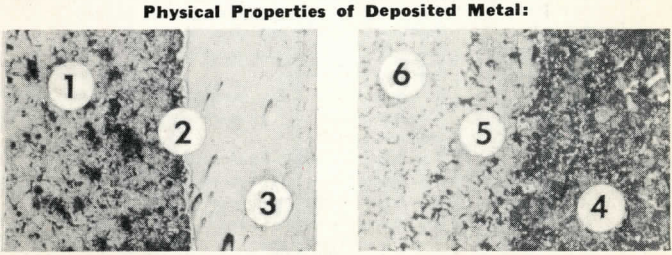
Keep Bevel Angle Small . . . grind or chip weld area to 60° - 90° groove (larger angles increase shrinkage stresses).

Better Machineability . . . although preheating is generally not necessary, the machineability is improved by preheating. It also reduces welding strains.

Peen Hammer . . . the weld should be lightly peened during cooling.

Color Identification: Black coating, orange end, with blue spot.

Physical Properties of Deposited Metal:



Photomicrograph of Weld Section — 100 Magnifications

Position 1—Steel	Brinell-160	Position 4—Cast Iron	Brinell-155
Position 2—Fusion	Brinell-208	Position 5—Fusion	Brinell-221
Position 3—Weld	Brinell-172	Position 6—Weld	Brinell-201

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"
Amperes	45-85	75-130	100-150	130-175
Volts	16-20	20-24	21-25	22-26

MARQUETTE *Guide to*

STEEL ARC WELD

ASTM-AWS Specification No.	DESCRIPTION	Marquette Manufacturing Company, Inc.	Air Reduction Sales Co.	Alloy Rods Co.	American Agile Corporation	Champion Rivet Company	General Electric Company	Harnisch-feger Corporation	Hoba Brothe Compa
E 6010	All position welding of mild steel. Useful with D. C. only. (Rev. Pol.)	No. 105 Positive-Rod	Airco 78, 78E, 79E	Weld-Arc 6010	Agile-White	Blue Devil	W-22, 22H, 22S	AP, APV	No. 10,
E 6011	All position welding of mild steel. Useful with A. C. or D. C.	No. 130 Red-Rod	Airco 230	Weld-Arc 6011	Agile-Blue	Bluedac	W-26	AC-1	No. 33
E 6012	All position welding of mild steel. Useful with D. C. (Str. Pol.) or A. C.	No. 120 Code-Rod	Airco 87, 387	Weld-Arc 6012	Agile-Red-White Agile-Red-Wh.12	Gray Devil Gray Devil No. 2	W-20, 28	PF, FR	No. 12,
E 6013	All position welding of mild steel. Useful with A. C. or D. C.	No. 140 Production-Rod No. 151 White-Rod	Airco 90, 90A	Weld-Arc 6013 Weld-Arc6013H	Agile-Blue-Red Agile-Brown	Graydac	W-25	AC-3, SM	No. 447, 1
E 6016	For high sulfur, low alloy or high carbon steels. A. C. or D. C. (Rev. Pol.)		Airco 312				W-32		
E 6020	Flat position, fillet and deep groove welding. Useful with D. C. (Str. Pol.) or A. C.	No. 115 Hot-Rod	Airco 81, 315	Weld-Arc 6020	Agile-Blue-Grey	Black Devil	W-24, 27	DH-2	No. 111,
E 8011	All position welding low alloy, high tensile steel. Useful with A. C. or D. C.	No. 85 Hy-Test-Rod	Airco 383				W-58		
E 10013	All position welding low alloy, high tensile steel. Useful with A. C. or D. C.	No. 110 Hy-Test-Rod					W-55		

HARD SURFACING ARC

Not Classified	1.00% Carbon alloy for shock and abrasion resistance. Rockwell "C" 20-45.	No. 100 Hard-Rod	Airco 46		Dark Green	Hard Devil	W-93	Hartop Brown	
Not Classified	11%-14% Manganese, 4%-5% Nickel for austenitic manganese steel.	No. 250 Mang-Rod	Amsco Timang		Toughface	Tough Devil No. 1		Harnimang A Coated	Mangai Coate
Not Classified	Air hardening chrome alloy steel with unusual hardness and toughness.	No. 450 Hard-Rod	Airco 91	Wear-Arc 3	Hardface 400	Wear Devil B	W-94	Hartop Green	Tufanhar
Not Classified	Air hardening chrome-vanadium steel. Exceptional abrasion, impact resistant.	No. 550 Hard-Rod	Airco 388	Wear-Arc 6	Hardface 600	Wear Devil A No. 59	W-95	Hartop Red	Tufanhar
Not Classified	For building up cutting edges on tools and repairing dies. Rockwell "C" 60-63.	No. 650 Tool-Rod		Tool-Arc High-Speed	Silver-Red	Tool and Die Air Hardening		Hartop Yellow	Toolfa

CAST IRON ARC WI

Not Classified	Mild steel electrode for general purpose cast iron repair. Non-machineable.	No. 40 Blu-Rod	Airco 77		Black	Cast-I-Steel	W-83	Harcast	Strong
Not Classified	Cast iron electrode for machineable cast iron welds. Preheating required.	No. 42 Cast-Rod	Airco 95						Softcas
Not Classified	Nickel alloy electrode for machineable welds without preheating.	No. 44 Nicol-Rod	Airco 375	Nickelarc	Yellow Ni	Cast-I-Nickel	W-2075	Nicast	Nickel
Not Classified	Bronze electrode for brazing malleable iron, steel, cast iron and copper alloys.	No. 61 Bronz-Rod	Airco Silicon Bronze		Si Bronze				

STAINLESS STEEL ARC

A. I. S. I. No. 308	All position welding of 18-8 stainless steel. Used in welding 14% Manganese steel.	No. 308 Stain-Rod	Airco 19-9-A. C.-D. C.	Arcaloy 308	Agile 18-8	308	W-2308	Harstain A-18-8	308
A. I. S. I. No. 309	All position welding of 25-12 heat resisting steel. Used on stainless-clad.	No. 309 Stain-Rod	Airco 25-12-A. C. - D. C.	Arcaloy 309	Agile 25-12	309	W-2309	Harstain A-25-12	309
A. I. S. I. No. 347	All position welding of 18-8 stainless steel, columbium stabilized.	No. 347 Stain-Rod	Airco 19-9Cb-A. C.-D. C.	Arcaloy 347	Agile 18-8Cb	347	W-2347	Harstain A-18-8Cb	347

OXY-ACETYLENE WELD

Class I, Type A	Mild steel for run-of-shop welding.	No. 1							
Class I, Type A	Copper-coated mild steel rod.	No. 2	No. 7			Copper-Coated			
Class I, Type B	High-tensile welds in steel plates, etc.	No. 3	No. 4			High Test			
SAE 1095	High Carbon steel for hard surfacing.	No. 4				High Carbon			
Class II, Type A	Gray cast iron, fine grained, machineable.	No. 5	No. 9			No. 11			
Alcoa-2S	Pure aluminum welding.	No. 8			Aluminum	No. 2S			
Alcoa-43S	5% Silicon-Aluminum Alloy, general welding.	No. 9	No. 57		Aluminum-5%Si	No. 43S			
Alcoa-716	Aluminum brazing alloy, general brazing.	No. 716				No. 716			
Alcoa 803	Aluminum Solder.	No. 803							
	Flux-coated, 5% Silicon-Aluminum alloy.	No. 80							
Grade I, Class A	High quality bronze for general brazing.	No. 20	No. 20			Tobin Bronze			No. 9
Grade I, Class A	Low fuming bronze, high strength brazing.	No. 30	No. 27			No. 997			No. 9
Grade I, Class A	Low Fuming Bronze, Flux Coated.	No. 32							
	Nickel Silver, Flux Coated.	No. 38							
	Nickel Silver Brazing Rod.	No. 39							
	"Aladdin" Die Cast Rod.	No. 222							
A. I. S. I. Type 308	Low carbon, 18-8 stainless steel.	No. G308			Type 308	Type 308			
SAE 2512	5% Nickel steel, high strength welds.	No. 2512	No. 5						
Navy Alloy 5	Silver Solder, m.p. 1175° F. (50%).	No. 1175	Easy-Flow			Silver Flow			
	Silver Solder m.p. 1300° F. (15%).	No. 1300	Sil-Phos						
Grade II, Class B	Phos-Copper for brazing copper and alloys.	No. 1301	Phos-Copper			Phos-Copper			

Better Welding CHART

DING ELECTRODES

rt rs ny	Hollup Corporation	Lincoln Electric Company	Linde Air Products Corporation	McKay Company	Metal & Thermit Corporation	Page Steel & Wire Division	Reid-Avery Company	A. O. Smith Corporation	Steel Company of Canada (Stelco)	Westinghouse Electric & Manufacturing Company	Wilson Welder & Metals Co.
55	Sureweld B, BP	Fleetweld 5 Lightweld		McKay 15, 15D	Vertex Murex R	Hi Tensile C	Raco 7	SW-10, 8	704	Flexarc AP	98, 98V & O 98N, V & O
	Sureweld CB	Fleetweld 35		McKay 11	Murex A Ductone A. C.	Page-Armco	Raco 11	SW-14	504	Flexarc ACP	530
77	Sureweld N, NM	Fleetweld 7		McKay 17 ,116	Genex	Hi Tensile F	Raco 8	SW-11, 17	604	Flexarc FP, FP-2	107, 109
3, 313	Sureweld CN, UW	Fleetweld 37, 47 Planeweld 2		McKay 24,14,10	Alternex Murex U	Hi Tensile G Hi Tensile AF	Raco 13A, 13B	SW-15, 16, 18	404	Flexarc SW, SW-2	520, 520A
	Sureweld TS	Shield-Arc LH-70					Raco 16	SW-64		Flexarc Low Hydrogen	512
384	Sureweld F	Fleetweld 11		McKay 20	Murex F, FHP		Raco 20	SW-35, 25	804	Flexarc DH	105, 106
							Raco 8011				583
		Planeweld 1						SW-88			9SA-9LC

WELDING ELECTRODES

	Sureweld "7N"	Hardweld 100				Page HC				Hardentough 350	No. 4SA-4LC
ick ed	Sureweld 9E	Manganweld A		Frogalloy		Surface Saving No. 4	Racolloy Manganese	SW-515		Nickelmang Coated	
d 400	Addwear H	Wearweld		Hardalloy	Hardex 45		Raco 45	SW-530		Hardentough 450	No. 110
d 600	Addwear H-1 Addwear H-2	Faceweld 12			Hardex 60		Raco 55	SW-520		Hardentough 550	
er	Sureweld TD	Toolweld 60		Tool and Die				SW-540			

ELDING ELECTRODES

ast	CI-8	Ferroweld		McKay 19				SW-5		Castingweld	No. 97
t C	CI-22							SW-301			No. 95
ast	Ni-Rod	Softweld		Nickalloy	Ni-Rod		Racolloy Ni			Freemachine-weld	No.575NI-ROD No. 12

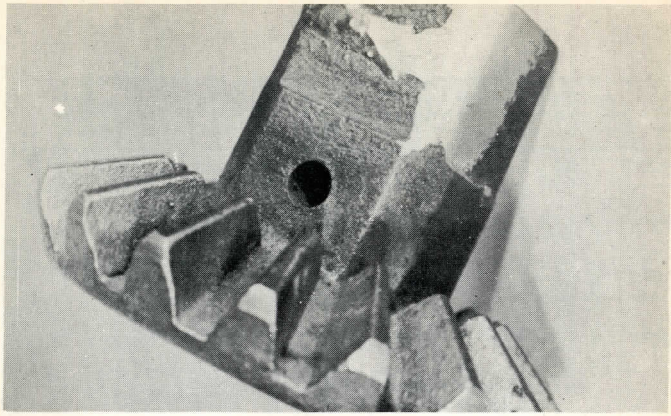
WELDING ELECTRODES

	Sureweld 19-9	Stainweld A7		McKay 18-8	M & T 308	Page-Allegheny 308	Racolloy 18-8	SW-362		308-16	L-308 & T-308
	Sureweld 25-12	Stainweld B		McKay 25-12	M & T 309	Page-Allegheny 309	Racolloy 25-12	SW-166		309-16	L-309 & T-309
	Sureweld 19-9Cb	Stainweld A7-Cb		McKay 18-8Cb	M & T 347	Page-Allegheny 347	Racolloy 18-8Cb	SW-153		347-16	L-347 & T-347

ING AND BRAZING RODS

	No. 2					Page LCS	Mild Steel						
	No. 1		No. 7			Page C	Pure Iron	Diam.	Size	Steel	Bronze Copper	Alumi-num	Cast Iron (Square)
	No. 6		No. 1 H. T.			Page HTM	High Tensile	1/16 in.	•	31	29	91	
	No. 3		No. 6CM			Page HC		3/32 in.	●	14	13	41	
	No. 99		No. 9					1/8 in.	●	8	7	23	
	No. 3110		No. 14					5/32 in.	●	5			
	No. 3112		No. 23					3/16 in.	●	3½	3	9	4
	No. 716							1/4 in.	●	2	2	6	2½
	No. G-2							5/16 in.	●	1⅛			1½
4	No. 2900		Tobin Bronze					3/8 in.	●	1	1	1	1
2	No. 3500		No. 25M										
	Redifluxed Bronze		No. 25M-Flx Ctd										
	No. 5200												
	No. 700												
	No. 120		No. 28			Type 308							
	No. 5												
	No. 1270												
	Phos-Copper		No. 19										

Approximate Number of MARQUETTE WELDING RODS Per Pound



No. 42 CAST-ROD

- Foundries
- Machined Parts
- Gear Teeth
- Machine Beds
- Lathe Beds
- Pulleys

Machineable Cast Iron Welds

Machineable Gray Cast Iron Welds . . . are made possible by the special coating.

Make Welds on Cast Iron — With Cast Iron . . . The physical properties of the weld metal and the base metal are exactly the same.

Soft Gray Iron Weld Deposit . . . the deposited metal is clean, soft gray iron, without porosity, slag inclusions or hard areas.

Matches the Parent Metal . . . in both color and texture when machined.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity), using the proper size rod, and a fairly high amperage. Puddle the metal for best results.

Flat Position . . . all welding must be done in a Flat Position.

Preheat All Castings . . . for best results, all castings should be preheated to 400° F. or over.

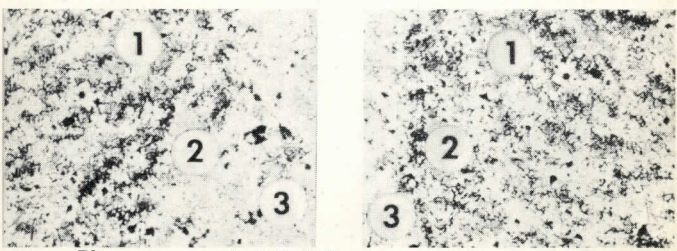
Multiple Passes . . . apply successive passes immediately . . . do not allow the weld to cool.

Preheating Small Castings . . . heating and grooving the fracture can be done at the same time by using a coated steel electrode and high amperage. (This method is fast, but tends to produce hard areas next to the weld). If critical machining is to be done, it is best to grind or chip the groove.

Cool Weld SLOWLY . . . cover finished weld with asbestos paper to retain the heat as long as possible. The slower the casting is cooled, the softer the weld, and the finer the grain structure.

Color Identification: Black coating, white spot with orange end.

Physical Properties of Deposited Metal:



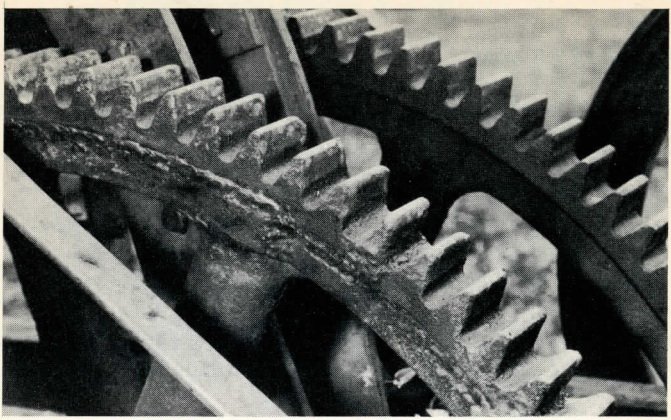
Photomicrograph of Weld Section—100 Magnifications

Position 1—Gray Cast Iron Brinell-170
Position 2—Weld Fusion Zone Brinell-217
Position 3—Weld Metal Deposit Brinell-269

Recommended Amperages

Diameter	1/8"	3/16"	1/4"
Amperes	115-175	150-225	200-325
Volts	22-24	23-26	25-30

METALLIC ARC BRAZING A.C.-D.C.



No. 61 BRONZ-ROD

- Stove Grates
- Gears
- Sprockets
- Cylinder Heads
- Cast Iron and Castings
- Farm Equipment
- Pulleys
- Furnace Doors, Grates

For Brazing Cast Iron, Malleable Iron, Steel, Copper, Silicon Bronze, Etc.

You can "Arc Braze" the same as you "Arc Weld", with this Versatile electrode, using A.C. or D.C. welding equipment.

High Tensile Brazing . . . use the same way as a welding electrode to produce high tensile brazing jobs.

Splendid Results . . . oftentimes when other methods fail! Recommended for joining cast or malleable iron that is oil soaked, extremely dirty, rusty or burned. It will also braze cast iron to steel, bronze to bronze, or bronze to cast iron or steel.

Easy to Use — Faster . . . much faster than carbon arc or gas brazing.

Stronger than Cast Iron . . . use No. 61 Bronz-Rod where toughness is essential. The copper alloy withstands vibration stresses and absorbs shocks.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity).

Preheat the Work . . . All copper alloys* conduct heat so rapidly that unless the work is preheated, the deposited bronze will not flow out, and some porosity results. (When the work is preheated, the bronze flows freely and wets the surface.) *Silicon Bronze, Everdur and Pure Copper, etc.

Quick Preheating . . . multiple passes may serve as ample preheating on some jobs.

Clean Between Passes . . . care must be taken to avoid entrapment of the welding slag.

Peen Hammering . . . Peening the bronze, increases its strength and toughness, and produces a finer grain structure.

Color Identification: Bronze wire with Green coating.

Physical Properties of Deposited Metal*

Tensile Strength	55,000 p.s.i.
Yield Point	22,000 p.s.i.
% Elongation in 2"	8%
Rockwell Hardness	F 85

*Considerable variation may occur depending upon welding conditions

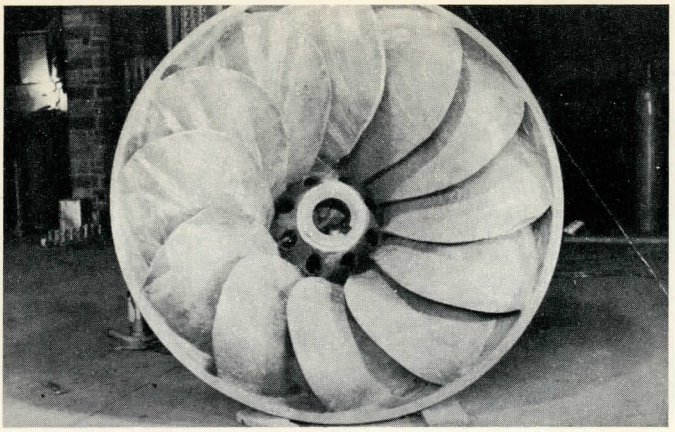
Chemical Analysis of Deposited Metal

Copper	97.03%	Silicon	2.85%
Iron	0.12%		

Recommended Amperages

Diameter	3/32"	1/8"	5/32"	3/16"	1/4"
Amperes	55-85	85-130	115-150	150-200	175-275
Volts	16-20	20-24	21-25	22-26	24-28

CAST IRON A.C.-D.C.



No. 40 BLU-ROD

- **Build Up, Repair New Castings**
- **Dirty Castings**
- **Faulty Castings**
- **Water Boiler Lugs, Heads and Plates**
- **Farm Equipment**
- **Machinery Bases**

Non-Machineable
All Position

Cheapest, Easiest Method . . . of welding any type of cast iron where Machineability is Not Required.

Good Fusion . . . the steel core wire combines with the extruded coating to give welds that neither crack, or have excessive porosity or pulling away at the fusion zone. The welds feature good fusion, without deep penetration, and are many times stronger than the parent cast iron.

Extreme Arc Stability . . . permits the use of low amperages, thus reducing stresses and cracking. This low heat also lessens the admixture of cast iron.

HOW TO USE: Weld with A.C. or D.C. (reverse polarity).

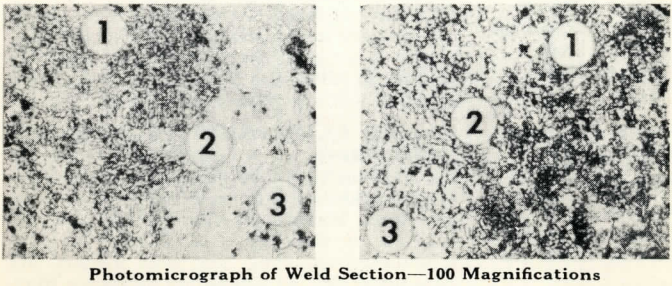
All Position . . . this electrode handles easily in vertical or downhand positions, with a minimum of spatter and slag. Use smaller electrodes and reduced amperages on Overhead Welding.

KEEP WORK COOL . . . at all times! This is extremely important. Keep work cool between passes.

Weld One to Three Inches at a Time . . . then peen hammer the weld during cooling to relieve the strains. Allow the metal to cool **before** additional metal is applied.

Color Identification: Blue coating, orange end with no spot.

Physical Properties of Deposited Metal:



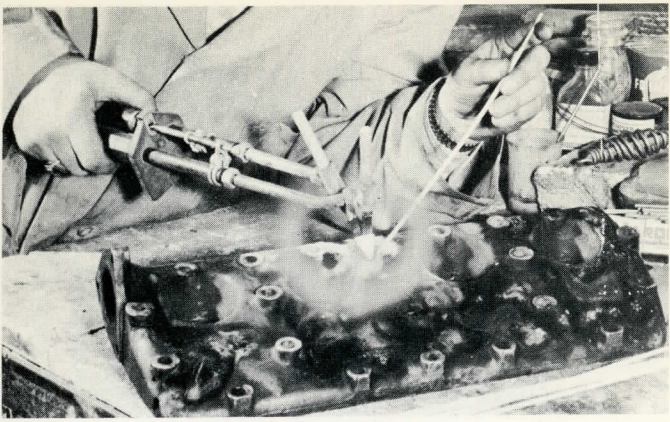
Photomicrograph of Weld Section—100 Magnifications

Position 1—Gray Cast Iron Brinell-192
Position 2—Weld Fusion Zone Brinell-229
Position 3—Weld Metal Deposit Brinell-255

Recommended Amperages

Diameter	3/32″	1/8″	5/32″	3/16″	1/4″
Amperes	45-85	75-130	100-150	130-175	150-250
Volts	16-20	20-24	21-25	22-26	24-28

ALUMINUM ELECTRODES and GAS RODS



ALUMINUM ELECTRODES

- Sand Castings
- Permanent Mold Castings
- Rolled & Extruded Forms

No. 70 ALUMINUM-ROD (Heavy Flux-Coated) D.C. . . . This is a 5% Silicon Aluminum Rod that has an extra heavy coating to permit metallic-arc welding of Aluminum with D.C. machines, using reverse polarity.

- Sand Castings
- Permanent Mold Castings
- Rolled & Extruded Forms

No. 80 ALUMINUM-ROD (Flux-Coated) Arc Torch or Gas . . . This Flux-Coated, 5% Silicon Aluminum Rod produces excellent welds with either electric Arc Torch or Gas. The scientifically prepared flux carried on the rod allows the metal to flow freely. The weld metal is free of slag inclusions, and equal to the parent metal in strength and ductility.

ALUMINUM GAS RODS

- Aluminum Sheet
- Aluminum Castings
- Extruded Aluminum Alloys

No. 9 ALUMINUM-ROD (43-S) This Aluminum Rod contains approx. 95% Aluminum and 5% Silicon. This alloy has a substantially lower melting point than pure aluminum, and helps dissipate the stress of solidification, shrinkage and thermal contraction that occurs in the weld zone as it cools. Use Marquette No. 22 Aluminum Welding Flux for sound welds.

- Thin Aluminum Sheets
- Plugging Small Holes or Cracks
- Thin Sheets to Heavy Castings
- Aluminum to other metals (Steel, Copper, Monel, etc.)

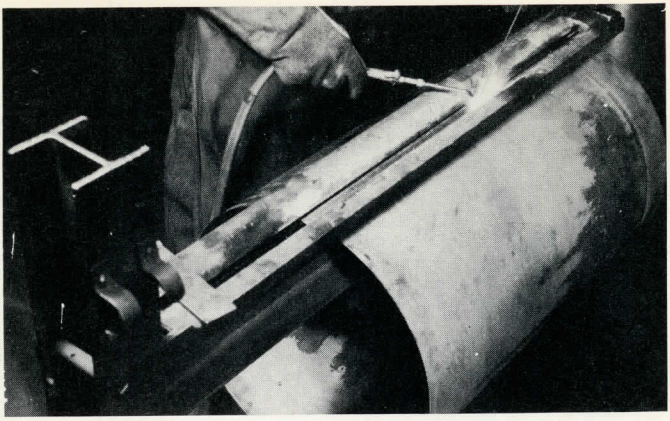
No. 716 ALUMINUM BRAZING-ROD (Low Temperature) . . . It's the Best Method of joining Thin sheets of Aluminum or for plugging small holes or cracks. Joins Thinnest Sheets perfectly or joins Thin to Heavy Gauge Aluminum or Castings. Also ideal for joining Aluminum to Steel, Copper, Monel, etc. Brazing joins at a lower melting point than welding, and does not melt the parent parts. No. 716 Aluminum Alloy with Marquette No. 33 Brazing Flux will completely wet the surface.

- Sheet Aluminum
- Extrusions
- Castings
- Aluminum to Copper, Brass, Iron, Steel, Nickel, etc.

No. 803 ALUMINUM SOLDER (Low Temperature) . . . A versatile new solder that has a low melting point near 400 degrees. Your regular soldering iron, or soldering torch is all you need. Handles all Aluminum Sheets, Extrusions or Castings (except those of high magnesium content). For Best Results, use Marquette No. 62 Aluminum Soldering Flux.

- Die Cast Parts, Units and Trim
- Grilles
- Frames
- Brackets, etc.

No. 222 "ALADDIN" DIE-CAST-ROD . . . "Aladdin" Rod produces strong welds on Zinc Base Die Castings (the most difficult of metals to weld). Requires no flux. Extremely easy-to-use. May also be used to Braze Aluminum. Has low melting point of 732°.



CARBON AND ALLOY STEEL AND CAST IRON

- Auto Maintenance
- Auto Frames, Body and Fender
- Structural Steel
- Sheet Metal, Etc.

No. 2 COPPER COTE STEEL ROD . . . A Low Carbon Steel of carefully controlled analysis. Produces sound, high quality welds of above average tensile strength and ductility. Copper Coated to prevent rusting and improve corrosion resistance.

- Farm Machinery
- Pipes, Tanks
- Structural Steel
- Boilers

No. 1 MILD STEEL-ROD . . . A Good Quality Rod with a bright finish for general purpose acetylene welding of mild steels. Tensile strength and ductility matches average parent metal.

- High Tensile Structural Steel
- Pressure Tanks
- Pipe, Plate, Etc.

No. 3 HY-TEST-ROD . . . A High Tensile Steel welding rod that is unequalled for high strength and ductility. Use small sizes for sheet metal welding. It flows readily, and makes superior welds.

- Hard Surfacing
- Mild Abrasion
- Overlays

No. 4 HY-CARB-ROD (S.A.E. 1090) . . . This High Carbon Steel rod has a bright finish, and is used in welding all high carbon steels. The work should be Preheated and Stress Relieved after welding due to its high carbon content. Weld with a slightly reducing flame to avoid oxidation. Weld deposit may be hardened by quenching.

- Cast Iron Parts
- Castings
- Gears, Sprockets

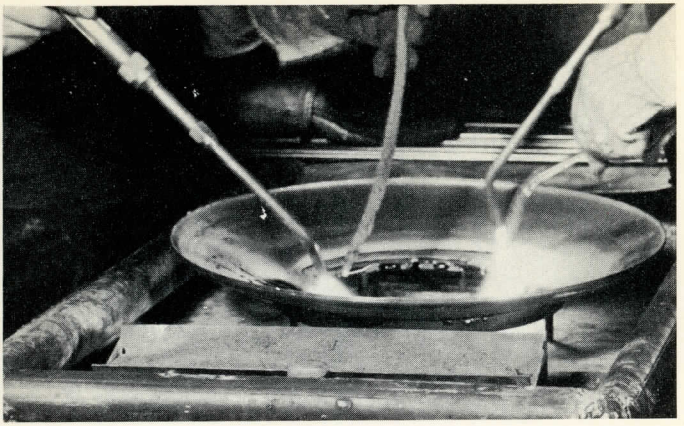
No. 5 CAST-IRON-ROD . . . A High-grade Cast Iron. Produces Soft, Machineable welds on all Cast Iron parts. Careful control of silicon and impurities assure good welding results.

- Build Up Shafts, Axles
- Forgings, Etc.
- Snow Plow Blades

No. G-2512 NICKELOY-ROD . . . Nickel Steel is used where strength, hardness and toughness is required without sacrificing ductility. Nickel gives steel the ability to withstand heavy impact at extremely High and Low Temperatures. Welds respond readily to heat treatment.

- Heat Exchangers
- Dairy Equipment
- Auto Bumpers
- Storage Tanks

No. G-308 STAIN-ROD . . . use this Stainless Steel rod for welding all Stainless Steels of the 18-8 classification. High Corrosion Resistance, weld metal is equal or superior to parent metal. Widely used for welding Light Gauge Stainless Steel Sheet.



SILVER, COPPER AND COPPER ALLOY RODS

- Cast Iron
- Malleable Castings
- Steel and Cast Steel
- Bronze and Copper Alloys

No. 30 MANGANESE BRONZ-ROD — LOW FUMING . . . a Manganese Bronze of highest quality. It tins easily, and produces strong, sound bronze welds. It also fuses well with bronzes and all copper alloys.

- Build Up Brass Parts, Worn Shafts, Etc.

No. 20 BRONZ-ROD . . . a good quality Naval Brass for general brazing. It tins freely and flows smoothly. Recommended for building up worn brass parts, and worn shafts to be machined.

- Cast Iron
- Malleable Castings
- Steel and Cast Steel
- Copper and Copper Alloys

No. 39 NICKEL SILVER-ROD ("White Bronze" Brazing Rod) . . . Nickel Silver produces higher strength brazed joints in steel or cast iron. Flows Freely . . . at relatively low welding temperatures, and with very little fuming.

- Iron, Steel
- Stainless Steel
- Monel Metal
- Inconel
- Everdur, Etc.

No. 1175 SILVER ALLOY-ROD . . . a high silver (45%) alloy having a low melting point of 1145° F. Joins both Ferrous and Non-ferrous Metals such as Iron, Steel, Stainless Steel, Everdur, Monel Metal, Inconel, Etc. Use Marquette No. 4 Silver Solder Flux for best results.

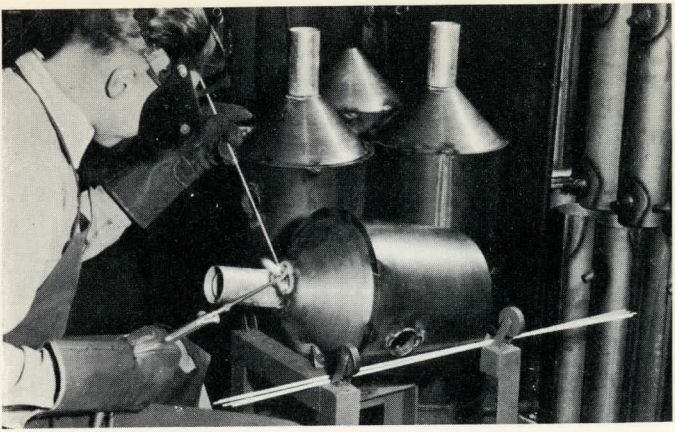
- Copper
- Brass
- Bronze
- Nickel Alloys

No. 1300 SILVER ALLOY-ROD . . . for Economical, Low Temperature Brazing on Non-ferrous Alloys. This low silver alloy (15% silver) begins to melt at approx. 1185° F., and flows freely at 1300° F. It penetrates deeply, and makes strong, leak-tight joints. It is intended for use ONLY on Non-ferrous Alloys.

- Copper
- Bronze
- Nickel
- Silver
- Brass, Etc.

No. 1301 BRAZALOY-ROD . . . Economical, this patented phosphorus-copper base, easy-flowing alloy makes strong leak-proof, corrosion resistant, self-fluxing joints at low material and labor costs.

Versatile Brazaloy . . . is recommended for making all types of joints between copper, bronze, nickel, silver, brass and other Non-ferrous metals.



No. 32 FLUX-COATED MANGANESE BRONZ-ROD

- Cast Iron
- Malleable Castings
- Steel
- Cast Steel
- Bronze
- Copper and Copper Alloys

New and More Convenient . . . for brazing Steel, Cast Iron or Copper Alloys. All the superior qualities of No. 30 Low Fuming Manganese Bronz-Rod are enhanced by coating the rod with the Best Quality Brazing Flux.

More Economical . . . Flux-Coated to save welder's valuable time usually lost in manual fluxing (repeated heating and fluxing bare rods).

Better Looking Brazing . . . Uniform Fluxing also produces better looking, better quality brazing. Rods heated and dipped into flux are unevenly coated and often some flux falls or spalls off — giving wide variations in the flux supply. These wide variations cause differences in the quality and appearance of the completed work.

Very Active Flux Coating . . . specially selected for its ability to readily dissolve all oxides present before heating, or formed during the brazing operation.

Easily Removed Flux . . . when cool, the flux is easily removed, leaving a clean, smooth brazed joint.

No. 38 FLUX-COATED NICKEL SILVER-ROD

- Steel Tubing
- High Strength General Brazing
- Pipe
- Cast Iron

Highest Strength, Low Melting Point . . . and exceptional ease of handling are all combined in this Flux-Coated "White Bronze" Rod.

Flows Very Freely . . . and penetrates into the finest crevices. The white color gives a good match for Iron, Steel and Stainless Steel.

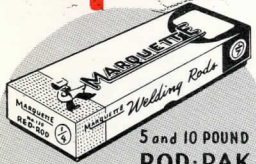
Outstanding Wear Resistance . . . dense and smooth overlays that have a very low coefficient of friction, and take a high polish.

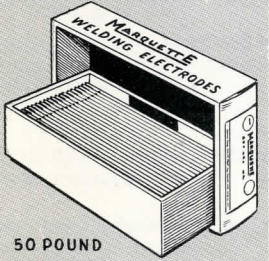
FLUXES

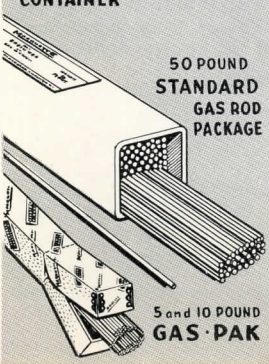
WELDING, BRAZING and SOLDERING FLUXES

Use With These Gas Rods	
No. 20 No. 30 No. 39	**No. 1 All Purpose Flux for TORCH BRAZING** . . . a Compound for use with oxy-acetylene or Arc Torch in the general brazing of steel, malleable iron, cast iron and galvanized iron. It is also used when welding copper, brass, bronze or other copper alloys.
No. 5	**No. 2 CAST IRON WELDING Flux** . . . this flux must be used when welding Cast Iron with Cast Iron Rod with either Oxy-Acetylene or Arc Torch. It cleans the metal surface of iron oxides, silica, and other impurities to produce a clean weld, free of gas pockets and slag inclusions.
No. 1175 No. 1300	**No. 4 SILVER SOLDER Flux** . . . specially prepared for use with Silver Alloy-Rods. Has low fluid temperature and quick-acting chemicals to dissolve oxides rapidly and thoroughly to make strong, leak-proof joints.
No. 20 No. 30 No. 39	**No. 5 CAST IRON BRAZING Flux** . . . A Low Temperature Flux specially prepared for brazing Cast or Malleable Irons. Due to the low melting point of this flux, the hot iron is protected from atmosphere oxidation, and the bronze flows freely and penetrates deeply into the joint.
No. 9	**No. 22 ALUMINUM WELDING Flux** . . . this flux is designed for Oxy-Acetylene or Arc Torch welding of Sheet, Cast or Extruded Aluminum or Aluminum Alloys. It is required when No. 9 Welding Rod is being used.
No. 716	**No. 33 ALUMINUM BRAZING Flux** . . . this flux must be used to clean the base metal, to allow the brazing metal to tin the base. Thorough cleaning of the metal is essential before brazing.
No. 803	**No. 62 ALUMINUM SOLDERING FLUX** . . . the secret of strong, good-looking Aluminum Soldering. The work must be thoroughly cleaned to allow the flux to prepare the metal for soldering.
Arc Welding	**SPATTER SHIELD** . . . (For Electric Welding) Prevent Welding Spatter from adhering to the metal surface. Simply "paint" this patented coating on the area normally covered with spatter. When dry, "Spatter-Shield" is brushed off, carrying the spatter and slag with it.

The Right Rod For the Job...







Help Yourself to Better Welding... The Marquette Rod-Bar is designed for your convenience. Select your electrodes, gas rods and flux "self-serve" style, next time you visit your Marquette Jobber.

Garages, Small Shops, Maintenance Departments, Etc. . . . all buy ROD-PAK—Marquette's handy 5 and 10 pound Electrode Package. It's the Ideal Size for all who need a fresh supply of many types of electrodes in limited quantities.

Marquette ROD-PAK...is instantly identified. Electrode types and sizes are clearly printed on both ends of the carton. Full instructions and recommended uses on every ROD-PAK speeds selection of "The Right Rod for Every Job." ROD-PAK protects electrodes from loss and mix-up, and keeps them in top condition for maximum performance at all times.

Marquette GAS-PAK . . . Now you can buy gas rods in convenient 5 and 10 pound packages. Packaging cuts rod wastage due to bent, damaged or unidentified rod . . . and most important, it enables you to carry a more complete assortment, with less investment.

Larger Users . . . order Marquette Electrodes and Gas Rods in Standard 50 pound Containers. Attractive bonus discounts are available on quantity purchases. Ask your Jobber.

MARQUETTE A.C. Arc

REGISTERED U.S. PAT. OFFICE

. . . Garage, Shop, Repair and Maintenance Welding

70 Series
150 200 250 Amperes

Completely Equipped

No Extras to Buy

Complete, Ready to Weld . . . with Helmet, Welding and Power Cables, Electrode Holder, Ground Clamp, Power Plug, Wall Receptacle, Instruction Manual and Package of Electrodes.

FEATURES

Wide Welding Range . . . 20 amperes for light gauge metal to top heat for heaviest jobs.

Accurately Calibrated Heat Stages . . . for positive, accurate heat selection.

Capacitor Equipped . . . "C" models are Capacitor Equipped for High Power Factor.

Negligible Maintenance . . . no moving parts to lubricate, get out of order, wear out or replace.

New, Built-For-Action Welder . . . everything from the excellent welding characteristics to the heavy-duty 10 inch zero pressure tires combine to give you all the latest advanced features of electrical and mechanical design.

Instant Arc Striking . . . Features the latest Air-Gap type Reactor which provides that extra surge of power for Instant Arc Striking . . . and smooth, steady welding.

Lowest Operating Cost . . . high electrical efficiency cuts operating cost to a minimum.

Variable Voltage Control . . . voltage is automatically controlled to assure good arc characteristics for every job.

Efficient Transformer . . . newly designed Reactance type, has Silicon Steel Core for top electrical efficiency.

ELECTRICAL SPECIFICATIONS

Model No.	Welding Current Range, Amperes	Input Voltage	Input Amperes	Rated Output ½ Hr. Power Factor	Rated Output ½ Hr. Arc Volts	Rated Output ½ Hr. Sec. Amps.	Electrode Sizes
70	20–150	230*	28.5	76%	38.0	120	1/16"-5/32"
71	20–200	230*	38.2	75%	38.5	160	1/16"-3/16"
71C	20–200	230*	33.2	87%	38.5	160	1/16"-3/16"
72	20–250	230*	45.1	78%	37.5	200	1/16"-1/4"
72C	20–250	230*	36.3	97%	37.5	200	1/16"-1/4"

*Standard is 220-240 Volts. 440, 550 and other voltages available at slight extra cost.

Welding Equipment

Heavy duty INDUSTRIAL WELDERS

Features Low 65 Open-Circuit Voltage, and Instant Arc Striking for Faster, Better, More Economical Welding.

Specially designed for Top Industrial Welding Performance.

FEATURES

Quick Amperage Selection . . . smooth turning handle, fast acting screw.

Big, Easy-To-Read Dial . . . Accurately calibrated, no backlash, clear numbers.

Air Cooled Transformer . . . Coils have ducts for natural convection cooling. Eliminates the need for forced ventilation.

No Flexing Wires to Break . . . All current adjustments are made by moving the core of the adjustable reactor.

No D.C. Magnetic Blow . . . to cause difficult arc control, excessive spatter or unsatisfactory welds.

Completely Weatherproof . . . sturdy, bonderized steel cabinet with durable Dulux finish.

Smooth, Steady Welds . . . has patented, built-in Stabilizing Circuit. There are no troublesome boosters or gadgets.

HEAVY-DUTY, Industrial Rated . . . built to meet N.E.M.A. standards. Operates at rated load—60% duty cycle, and maximum load at 35% duty cycle.

Instant Arc Striking . . . patented built-in Arc Stabilizer combines with the efficient circuit to give LOW Open Circuit Voltage of D.C., at a fraction of the operating cost.

HYPERSIL Transformer Cores (type C) . . . Patented by Westinghouse. Has 1/3 greater efficiency. Reduces Weight, Improves Performance.

Power Factor Correction . . . Industrial type Heavy-Duty Capacitors for High Power Factor. Earns lower power rates, and lower installation costs.

Positive Welding Cable Connections . . . prevent accidental shorting or twisting. Special two-bolt Heavy-Duty Terminals are mounted on heavy Micarta panel.

ELECTRICAL SPECIFICATIONS

Model No.	Rated Amps. at 60% Duty Cycle	Rated Load Volts	Welding Current Range				Primary Amps. at Rated Load			Rated Load Performance		
			Min. Amps.	Min. Load Volts	Max. Amps.	Rated Load Volts	220	440	550	KVA	PF	EFFIC.
80C	200 Amps.	40	40	20	250	40	50	25	20.4	11.2	80%	91%
81C	300 Amps.	40	60	20	375	40	72	36	29.2	16.1	80%	90%
82C	400 Amps.	40	80	20	500	40	102	51	40.8	22.4	80%	90%

MARQUETTE A.C. Arc

REGISTERED U.S. PAT. OFFICE

Specially Built for Rural and R. E. A. Hi-Lines

Just Plug it in . . . to the heat you want. Thirteen heat taps from 20 to 180 amperes, give full range for every Farm Welding job.

Hi-Line Operation . . . built to meet specifications of N.E.M.A., R.E.A. and Underwriters' Laboratories, Inc. 230 Volts, 60 Cycle.

Highest Quality Materials . . . and Workmanship throughout.

Fully Equipped . . . nothing else to buy. Welding and Power Cables, Helmet, Ground Clamp, Electrode Holder, Etc.

APPROVED R. E. A. N. E. M. A.

Make Your Own Repairs . . . yes, with a Marquette Farm Welder, you can make quick, dependable repairs right on your own farm. You can do many jobs in a few minutes that would be impossible with ordinary tools.

Time Means Money . . . during busy planting, growing and harvesting seasons. Implement breakdowns can be mighty expensive.

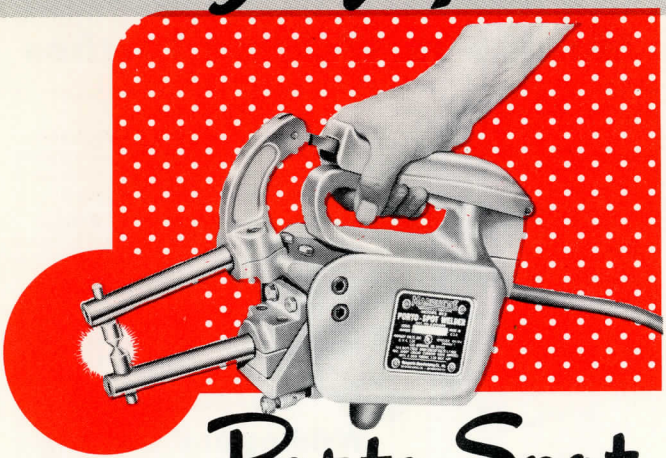
Pays for Itself . . . Your Marquette Farm Welder pays for itself many times over, for emergency repairs alone. Be prepared to make your own low-cost repairs, in a hurry, by welding. Prevent Trouble, by keeping equipment in top condition all year 'round. Hardsurfacing cultivator bits, etc., doubles or triples the life of these parts.

Build New Equipment . . . with typical American Farmer's ingenuity, you can build gates, hay loaders, tanks, conveyors, and hundreds of useful tools and equipment.

ELECTRICAL SPECIFICATIONS

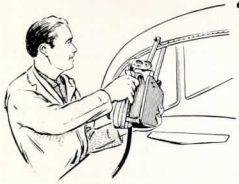
Model No.	Welding Amperes	Electrode Range	Open—Circuit Voltage	Cycle	Phase	Primary Volts	Primary Amperes	Arc Volts	Power Factor
60	20–180	1/16"–3/16"	65.50	60	1	230	43.5	25	60%
60C	20–180	1/16"–3/16"	65.50	60	1	230	35.8	25	75%

Welding Equipment



Porto-Spot AUTOMOTIVE SPOT WELDER

Repair Body and Fender Metals the Modern Way... the Factory Way!



- **FASTER**
- **MORE ECONOMICAL**
- **WITHOUT DISTORTION**

WELDS MILD AND STAINLESS STEELS

(up to 1/8" Combined Thickness)

Turret Tops . . . Porto-Spot is ideal for this difficult job.

Doors . . . Porto-Spot welds 'em straight and true.

Body and Fender . . . repair and replacement.

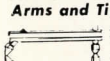
Trucks and Trailers . . . versatile Porto-Fast makes these Big jobs easier.

Air-Conditioning, Heating . . . just the thing for on the job duct assembly.

Sheet Metal Work.

Metal Furniture.

Add Versatility with Porto-Spot Arms and Tips.



Standard, Angle or Extension Arms are available in 6 and 12 inch lengths.

Standard Type Arms handle most automotive and sheet metal jobs. Angle Arms are for Turret Tops. Extension Arms give extra reach. Special "Offset", "30-degree", Type "F", and Type "M" Arms make problem-jobs easy to reach.

This intermittent-duty Spot Welder is ideal for all shops doing sheet metal work or fabrication.

Completely Self-Contained . . . weighs only 24½ pounds with 6" Arms and Tips. As easy to use as your electric drill. Heavy copper arms carry power direct to the Welding Tips.

Vise-Like Grip...ingenious compound lever exerts powerful pressure for positive contact between metals (a MUST for all good, sound spot welds).

No Metal Distortion . . . Welding is practically instantaneous!

Light in Weight . . . and Power Packed in Performance. High-Tensile Aluminum Castings and efficient Silicon-Steel transformer core. Delivers high amperage for Quick, Sure welds!

Here's Real Portability...for hard-to-get-at jobs. Its range is unlimited when used with a Power Cable Extension!

Model 275 Specifications . . . 220-240 Volt, 50-60 Cycle, Single Phase. Operates on 50 Ampere Fuses. Draws current only when handle is squeezed shut. Equipped with 10 ft. Power Cable, 6-inch Two-in One Arms, Two 45° and Two 90° Long-Life Tips.

MARQUETTE Oxy-Acetylene

REGISTERED U.S. PAT. OFFICE

Marquette Welding Torches

Wide Welding Range . . . Model "A" Torch has 15 Welding Tip Assemblies with swaged, one-piece solid copper tips. The mirror-smooth tips produce a soft flame that's hot, efficient and quiet.

Individual Mixing Sections . . . provide for most efficient and economical flame.

Automatic Tip Alignment . . . provides multiple tip positions, and protects threads.

Precision Ground Needle Valves . . . of Stainless Steel for extra durability, wear resistance, accurate flame adjustment and positive gas shut-off.

Stainless Steel Heat Barrier . . . exceptionally cool operating handle. Stainless Steel guards against stripped threads and damaged seats.

No. 1 Outfit

Oxy-Acetylene Welding and Cutting

Weld, Braze, Cut . . . Handle all jobs with speed and efficiency. For all general welding and cutting, and non-ferrous welding, brazing and soldering.

Cutting Assembly . . . Engineered and precision built for wide cutting range—up to 6 inches! Furnished with 1A4 tip for medium cutting. Special welding and cutting tips are available.

Fully Equipped . . . Torch, Tips, Regulator, Hose, Lighter, Etc., No extras to buy!

No. 10 Aircraft

Oxy-Acetylene Welding and Cutting

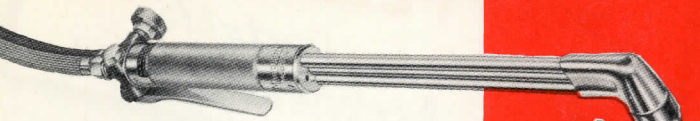
Weld, Braze, Solder, Cut . . . this Aircraft Welding and Cutting Outfit is designed for Body Shops, Sheet Metal Shops, Garages, Aircraft, Air-conditioning and Refrigeration Plants.

Aircraft Torch . . . is light in weight, easy-to-handle, well-balanced. Features one-hand control with Finger-tip Needle Valves. Complete with Four Tip Assemblies.

Body and Fender Work . . . Aircraft, Sheet Metal, Steel, Aluminum and all light-gauge metals are easily welded with this versatile torch.

Cutting Assembly . . . has exceptional cutting range. Handles all cutting jobs up to 1½" thickness, with speed and efficiency of larger torches. You can shift from welding to cutting with the speed of tip assembly changing.

No Extras to Buy . . . It's Complete in Every Detail!



Model "C" Cutting Torch

This sturdily built Marquette Cutting Torch has all the features for Heavy-Duty, high-speed cutting. Delivers Top Performance at Lowest Cost.

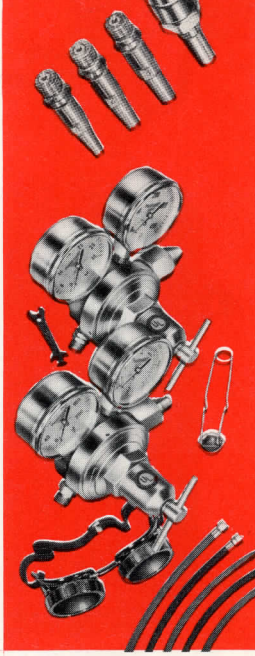
Perfectly Balanced . . . for hour after hour of 'round the clock cutting.

Heavy-Duty . . . Built to stand up under severe operating conditions. Equipped with Nickel Alloy tubes for greater strength and trouble-free service.

Wide Cutting Range . . . Interchangeable Cutting Tips handle everything up to 12 inches in thickness.

Refinery and Natural Gas . . . Gives outstanding performance if pressure of 5 pounds or over is available.

Complete Line of Tips . . . Acetylene Tips for Cutting, Scarfing, Sheet Metal, Rivet Cutting plus the Natural and Refinery Gas Cutting Tips.



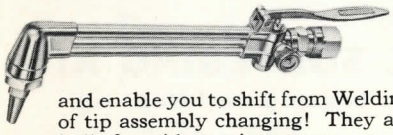
No. 9 Cutting Outfit

Heavy-Duty Cutting . . . for 'round the clock, heavy-duty cutting operations in Scrap Metal Yards, General Production, Foundries, Railroads, Etc.

Cutting Torch . . . All the features of the Model "C" Cutting Torch are described above.

No Extras to Buy . . . the Marquette Outfit is complete in every detail—with Cutting Torch, Tips, Acetylene and Oxygen Regulators, Hose, Welding Goggles, Wrench, Lighter, Etc.

MARQUETTE Cutting Assemblies



These versatile Marquette Cutting Assemblies fit torch handle same as Tip Assemblies, and enable you to shift from Welding to Cutting with the speed of tip assembly changing! They are engineered and precision built for wide cutting range.

Protected Seat and Threads... large swivel nut protects thread and seat.

Large Nickel Alloy Tubes . . . and Forged Head and body for extra strength.

Precision Control... Precision Valves, Long, easy-to-operate control lever.

High Temperature Valve Seats . . . of special High Temperature rubber.

Model "D1" Cutting Assembly fits Model "A" Series Torches. Maximum range 6". (Supplied with tip for medium range of $\frac{3}{4}$").
Model "E" Cutting Assembly fits Model "B" Series Torches. Maximum range $1\frac{1}{2}$".

Save up to 70% on Acetylene...

With a MARQUETTE Portable Acetylene Generator

- **Pressure Adjustment** . . . Large, easy-to-adjust screw has special ball-type thrust bearing and automatic stop.
- **Two Large Windows** . . . for clear visibility of carbide level. Double strength glass.
- **Carbide Supply Lock** . . . for positive off-on control of carbide feed.
- **Carbide Feed Valve** . . . Precision Pressure Control and Instant acting safety lock.
- **Accurate Pressure Gauge** . . . Large, easy-to-read.
- **Handy Carbide Filler Cap.**
- **Easy Hopper Removal** . . . Simply unscrew 3 nuts.
- **New Baffle Plates** . . . remove moisture, provide DRY, PURE Acetylene gas.
- **Ball Check Valve** . . . in Water Seal Tank acts as Hydraulic Safety Valve.
- **Underwriters' Laboratories, Inc.** . . . Listed with a Double Rating for your protection.

NEW, Advanced Engineering . . . and precision tooling is your assurance of a smooth, steady flow of Pure Acetylene for top welding and cutting performance.

You Get Four Times More Acetylene . . . for your Money, when you generate your own Acetylene with a Marquette Acetylene Generator.

Convenience . . . Water and carbide are all you need. No running out of gas in the middle of an important job.

Pure Acetylene . . . Marquette Acetylene Generators produce a steady flow of Pure, DRY Acetylene for a hotter, more uniform flame.

Stock No.	Carbide Capacity (14 ND)	Water Capacity	Maximum Gas Output per Hour	Shell Diam.	Height
GW3236	15 lbs.	17 gals.	30 cu. ft.	18″	49″
GW3237	30 lbs.	33 gals.	60 cu. ft.	21″	59″
GW3238	50 lbs.	51 gals.	100 cu. ft.	24″	69″

ACETYLENE SOLDERING KIT

for Soldering, Brazing and Heating

NEW . . . a Versatile and Portable Kit.

Easy to Operate . . . Uses Acetylene ONLY. Built-in Mixing Sections. Produces hot flame with no smoke or fumes.

Instant Heat . . . No Waiting, Pumping or Priming.

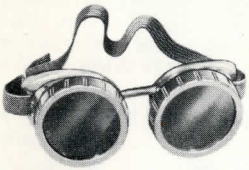
A Tip for Every Job . . . Four Torch Tips and One Soldering Copper.

MARQUETTE GAS WELDING ACCESSORIES

REGISTERED U.S. PAT. OFFICE

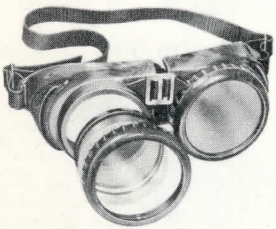
No. 9 Goggles

50 MM Hi-Test Lenses. Comfortable, Low Cost, Well Ventilated, Quick Lens Change, Cool, Non-fogging.



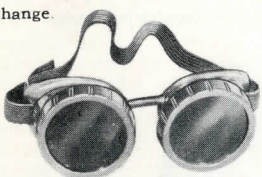
No. 2 Goggles

50 MM Federal Spec. Lenses filter out all harmful infra-red and ultra-violet rays. Cool, Comfortable, Non-fogging. Quick Lens Change.



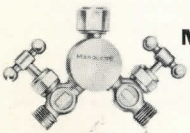
No. 3 Cover Goggles

For welders who wear glasses. 50 MM Federal Spec. Lenses (same as No. 2). Protects prescription lenses. Cool, comfortable, Non-fogging. Quick Lens Change.



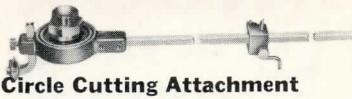
No. 8 Chipping, Grinding Goggles

50 MM Flat, Clear Federal Spec. Industrial Safety Lenses. Low Cost, eye-cup type goggle. Cool, Comfortable, Non-fogging. Quick Lens Change.



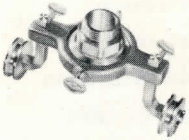
MARQUETTE Regulator Outlet Manifold

Saves Time and Gas. Get double-duty from a single set of cylinders. Connect Aircraft and Standard Torch to same set of regulators. Switch Instantly from one torch to the other without loss of gas. (Use one torch at a time, not for dual operation).



Circle Cutting Attachment

For Model "C" Cutting Torch and Model "D1" Cutting Assembly. Cuts perfect circles up to 36-inch diameter. Features square radius bar and centering pin. Ball Bearing Rotary Head. Cuts to extreme edge without wasting metal.



Cutting Torch Carriage

For Model "D1" and "C" Torches. Wheels are grooved to operate with straight edge or track. Cuts bevels up to 45°. Makes straight, perfect cutting easy, and reduces fatigue.

Heavy-Duty Preheating Torch

Marquette Preheating Torches operate on low-cost Bottle Gas. They are Instant Lighting and require no generating, pumping or compressed air. They are fast, safe and simple.

Heavy-Duty Model handles all Heating and Preheating jobs in Welding Shops, Thaws Water Mains, Ground, R. R. Switches, Etc. Heats Tar Kettles.

Standard Preheating Torch

Operates on low-cost Bottle Gas. (Has same features as Heavy-Duty Model.) Ideal for garages. Warm Differentials, Crankcases, Transmissions, Thaw Radiators, Start Tractors, Etc.

Two Sizes

MARQUETTE Tip Cleaning Kits

Take care of your tips, for long tip life, and Best Welding Flame.

Marquette Tip Cleaners are scientifically designed Stainless Steel Reamers. They keep tips clean without cutting, damaging, enlarging or gouging the tip.

Handy Aluminum Case

Light and Strong. Ideal for carrying in pocket. Protects tip cleaners from damage.

Standard Size for No. 00 to 5 Tips.
Jumbo Size for No. 5 to 14XH Tips.

Welding Equipment

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*Refer to Accessories Bulletin for additional equipment.

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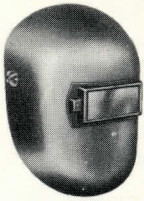
#Refer to Acetylene Equipment General Catalog for Complete Information on Oxy-Acetylene Equipment and Accessories.

You'll do

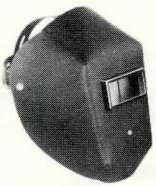
with NEW

No. 17 Weld-Master Helmet



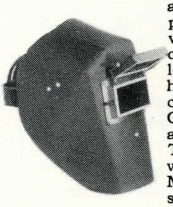
Off-On Tension, Full Protection, Weighs only 18 ounces. Has all the latest and most desirable features for maximum comfort. Moisture resistant sweat band.

No. 11 Full Protection Plus Durability



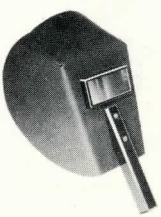
Has many new improvements. Stronger fibre for longer service, and greater strength. Spring Lens Clips. Off-On Headgear.

No. 13 with "Flip-up" Lens



Features handy "Flip-up" Lens plus all the standard features of protection, convenience and comfort. Both lenses are firmly held by spring clips. Adjustable Off-On Headgear and Chin Rest. Tough, light weight fibre. Moisture resistant sweat band.

No. 14 Durable Hand Type



Designed to give full protection from side light, with plenty of room for movement of the face. Heavy, durable fibre. Has spring catch for easy lens changing.

ELECTRODE HOLDERS

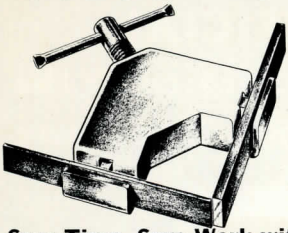
No. 4 Industrial . . . 500 Amperes and up to 3/8″ Electrodes. Ruggedly built for Heavy-duty welding. Cool, Efficient. Phenolic-Asbestos Jaw Covers.

No. 6 Industrial . . . 300 Amperes and up to 1/4″ Electrodes. Has additional feature of Adjustable Spring Tension. Insulated Handle and Jaw Covers.

No. 7 Featherweight . . . 200 Amperes and up to 3/16″ Electrodes. Light in weight and ruggedly built. Only 7 3/4″ in Length. Insulated Handle and Jaw Covers.

Better work

WELDING ACCESSORIES



Save Time, Save Work with Marquette Korner Klamps

Holds two pieces of metal at Exact Right Angle. Gives you the accuracy of steel square plus the positive grip of a machinist's vise. Holds pieces of unequal thickness up to 3/8".

ARC TORCH

Use with Any A.C. or D.C. Welder. (Specify type of Welder.) For Preheating, Heating, Welding Aluminum, White Metal, Copper and other Non-ferrous metals. For Brazing, Hard Surfacing and Soldering. Complete with Cables, Carbons and Adaptors.

Welding and Power Cables

Marquette Welding Cable is Tough, Durable, Flexible, Oil and Grease Resistant. Outer surface is smooth and clean so it will not collect or hold dirt and grease.

Ground Clamp SNAP-TITE

. . . makes positive ground connection with very little pressure. Durable Bronze Casting for high conductivity and Low Current Losses. 3 sizes 150 to 400 amperes.

Weld Cleaning Tools

Hand Forged Chipping Heads with tough, alloyed tool steel for long life of hard service. You'll appreciate the top-flight tool quality, and the fast clean work they do on the weld.

Electrode and Gas Rod

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We Stake Our Lives on Marquette Welds
...the OFFICIAL Welding Service at the Indianapolis Speedway
THE Guide TO BETTER WELDING
take advantage of
MARQUETTE
KNOW HOW
Select the RIGHT ROD for Every Welding Job!
MARQUETTE ROD & BAR
Silver Solder KIT
Aluminum KIT

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GET IT FROM YOUR JOBBER

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